**3GPP TSG-SA4 Meeting #111e  *S4-201578***

**Electronic meeting, Telco, Nov 11-20, 2020**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **26.501** | **CR** | **00xx** | **rev** | **0** | **Current version:** | **16.5.0** |  |
|  | | | | | | | | |
| *For* [***HELP***](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)*.* | | | | | | | | |
|  | | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network | **X** |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| ***Title:*** | Corrections and Clarifications on Metrics and Consumption Reporting | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Qualcomm Incorporated | | | | | | | | | |
| ***Source to TSG:*** | S4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | 5GMSA | | | | |  | ***Date:*** | | | 2020-11-15 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-16 |
|  | *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-12 (Release 12) Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | There are a numbers of bugs and inaccuracies in TS 26.501 regarding QoE metrics measurement, collection and reporting functionality as well as consumption-related measurement, collection and reporting functionality.  Note that the dCR in S4-201059, with a small exception as explained under “Summary of change”, contains identical content to this document, and was agreed at SA4#110-e. However, a formal CR was not produced. This contribution is intended to close that gap. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Various proposed spec text changes as follows:   * Clause 3.1: Clarifications and corrections on existing descriptions of 5GMSu Client and 5GMSd Media Player, and addition of new term and definition for Media Session Handler. * Clause 4.2.2: Addition of consumption measurement and metrics measurement as sub-functions of the Media Player. Modifications to name and tasks of consumption and metrics handling sub-functions of the Media Session Handler. Correction to description on internal API for metrics collection and reporting, and added description on internal API for consumption measurement collection. * Clause 4.3.1 on clarification text to M5u and M7u APIs pertaining to metrics handling. * Clause 4.3.2 on addition of metrics measurement and metrics collection & reporting as sub-functions of the 5GMSu Client, and clarification text on use of M7u with regards to metrics handling. * Clause 5.1: Clarification on Media Session Handling interface associated with 5GMSd AF, and miscellaneous bug fixes. * Clause 5.3.1 on usage of M1d interface for consumption reporting and metrics configuration, and modifications to portion of M1d provisioning domain model depicting consumption reporting and metrics configurations. Note that to maintain alignment with the BBC CR in Tdoc S4-201353 regarding the M1d domain model in Figure 5.3.1-1 of TS 26.501, the diagrammtic change in this CR deviates from that shown in the aforementioned dCR, specifically in the indicated cardinality of (0..\*) instead of (0..1) to denote the allowance of multiple metrics reporting configurations to be provisioned via M1d. * Clause 5.3.2 on provisioning steps pertaining to metrics and consumption reporting configuration and related descriptions of message flow steps regarding consumption and metrics handling. * Clause 6.1 on clarification of Media Session Handling interface associated with 5GMSu AF. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Mistakes and inaccuracy in various descriptions on metrics and consumption-related configuration and associated measurement, collection and reporting functionality can hinder clear understanding and interoperable implementations. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 3.1, 4.2.2, 4.3.1, 4.3.2, 5.1, 5.3.1, 5.3.2 and 6.1 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

1st CHANGE: Correction to clause 3.1

# 3 Definition of terms, symbols and abbreviations

## 3.1 Terms

For the purposes of the present document, the terms given in TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1].

**5GMS System:** An assembly of Application Functions, Application Servers and interfaces from the 5G Media Streaming architecture that support either downlink media streaming services or uplink media streaming services, or both.

NOTE 1: The components of a 5GMS System may be provided by an MNO as part of a 5GS and/or by a 5GMS Application Provider.

**5GMS Application Provider:** A party that interacts with functions of the 5GMS System and supplies a 5GMS-Aware Application that interacts with functions of the 5GMS System.

**5GMS-Aware Application:** Application in the UE, provided by the 5GMS Application Provider, that contains the service logic of the 5GMS application service, and interacts with other 5GMS Client and Network functions via the interfaces and APIs defined in the 5GMS architecture.

NOTE 2: Functionality of the 5GMS-Aware Application is outside the scope of this specification.

NOTE 3: A 5GMS-Aware Application associated with the delivery of either a downlink or uplink related 5GMS service is referred to as a 5GMSd-Aware Application or a 5GMSu-Aware Application, respectively.

**5GMS Client:** A UE function that is either a 5GMSd Client or a 5GMSu Client, or both.

**5G Media Streaming Client for downlink (5GMSd Client):** UE function that includes at least a 5G Media Streaming Player and a Media Session Handler for downlink streaming and that may be accessed through well-defined interfaces/APIs.

**5G Media Streaming Client for uplink (5GMSu Client):** Originator of 5GMSu service that includes at least a Media Streamer and a Media Session Handler for uplink streaming and that may be accessed through well-defined interfaces/APIs.

**5GMSu Media Streamer:** UE function that enables uplink delivery of streaming media content to an Application Server function of the 5GMS Application Provider, and which interacts with both the 5GMSu-Aware Application for media capture and subsequent streaming, and the Media Session Handler for media session control.

NOTE 4: The 5GMSu Media Streamer receives a Media Streamer Entry to initiate an uplink streaming session.

NOTE 5: The 5GMSu Media Streamer captures the media on the provided input devices. The 5GMSu Media Streamer exposes some basic controls such as capture, pause, and stop to the 5GMSu-Aware Application.

**Dynamic policy:** A Dynamic PCC Rule (c.f. TS 23.503[4]) for an uplink or downlink application flow during a media session.

**Egest Session**: An uplink media streaming session from the 5GMSu AS towards the 5GMSu Application Provider.

**Ingest Session:** Asession to upload the media content into a 5GMSd AS.

**Policy Template:** A collection of (semi-static) PCF/NEF API parameters which are specific to the 5GMS Application Provider and also the resulting PCC Rule.

**Policy Template Id**: Identifies the desired policy template, which is used by 5GMSd AF to select the appropriate PCF/NEF API towards the 5G System so that the PCF can compile the desired PCC Rule.

**Media Player Entry:** a document or a pointer to a document that defines a media presentation e.g. MPD for DASH content or URL to a video clip file.

**Media Session Handler:** UE function that communicates with the 5GMS AF in order to establish and control the delivery of a streaming media session in the downlink or uplink direction, and which also exposes APIs to the 5GMS-Aware Application and to the Media Player (for downlink streaming) or the Media Streamer (for uplink streaming).

**Media Streamer Entry:** A pointer (e.g. in the form of a URL) that defines an entry point of an uplink media streaming session.

**presentation entry:** A document or a pointer to a document that defines an application presentation e.g. an HTML5 document as defined in e.g. TS 26.307 [6].

**Provisioning Session:** a data structure supplied at interface M1d by a 5GMSd Application Provider that configures the 5GMSd features relevant to a set of 5GMSd-Aware Applications.

**5GMSd Media Player:** UE function that enables playback and rendering of a media presentation based on a media player entry and exposing some basic controls such as play, pause, seek, stop to the 5GMSd-Aware Application.

NOTE 6: A 5GMSd Media Player is expected to include a Media Access Client, Media Decoders, Media rendering/presentation, and possibly also a DRM Client, a Consumption Measurement and Logging Client and a Metrics Measurement and Logging Client. The 5GMSd Media Player's Media Access Client receives a Media Player Entry. The 5GMSd Media Player renders the media on the provided output devices, such as a display in case of video.

NOTE 7: The 5GMSd Media Player is functionally similar to the combination of a TS 26.247 [7] 3GP-DASH client and a TS 26.234 [8] PSS media decoder and renderer.

**Service Access Information**: Set of parameters and addresses (including 5GMSd AF and 5GMSd AS addresses), which are needed to activate the reception of a streaming session.

**Service and Content Discovery:** Functionality and procedures provided by a 5GMSd Application Provider to a 5GMS-Aware Application that enables the end user to discover the available streaming service and content offerings and select a specific service or content item for access.

NOTE 8: The Service and Content Discovery functionality and procedures are outside the scope of this specification.

**Service Announcement**: Procedures conducted between the 5GMS-Aware Application and the 5GMS Application Provider such that the 5GMS-Aware Application is able to obtain 5GMS Service Access Information, either directly or in the form of a reference to that information.

**third party player:** Part of an application that uses APIs to exercise selected 5GMSd functions to play back media content.

NOTE 9: Such APIs are for example defined in TS 26.307 [6] when using the Media Source Extensions for media playback. This type of player is downloaded by or built into an application, or it is downloaded with the Presentation Entry (e.g. as a JavaScript library).

**third party uplink streamer:** Part of an application that uses APIs to exercise selected 5GMSu functions to capture and stream media content.

NOTE 10: This type of streamer is typically implemented as downloadable software.

END OF 1st CHANGE

2nd CHANGE: Modification to clause 4.2.2

### 4.2.2 UE 5GMSd Functions

The UE may include many detailed subfunctions that can be used individually or controlled individually by the 5GMSd-Aware Application. This clause breaks down several relevant identified subfunctions for which stage 3 specification is available.

The 5GMSd-Aware Application itself may include many functions that are not provided by the 5GMSd Client or by the 5G UE. Examples include service and content discovery, notifications and social network integration. The 5GMSd-Aware Application may also include functions that are equivalent to ones provided by the 5GMSd Client and may only use a subset of the 5GMSd client functions. The 5GMSd-Aware Application may act based on user input or may for example also receive remote control commands from the 5GMSd Application Provider through M8d.

With respect to Media Player functions, Figure 4.2.2-1 below shows more detailed functional components of a UE for media player functions to access the 5GMSd AS.



Figure 4.2.2-1: UE 5G Downlink Media Streaming Functions (Media Player centric)

The following subfunctions are identified as part of a more detailed breakdown of the Media Player function:

- **Media Access Client:** Accesses media content such as DASH-formatted media segments.

- **Media Decapsulation:** Extracts the elementary media streams for decoding and provides media system related functions such as time synchronization, capability signalling, accessibility signalling, etc.

- **Consumption Measurement and Logging Client:** Performs the measurement and logging of content consumption-related information in accordance with the Consumption Reporting Configuration part of provisioning data, supplied by the 5GMSd Application Provider to the 5GMSd AF, and forwarded by the 5GMSd AF to the Media Player via the Media Session Handler.

- **Metrics Measurement and Logging Client:** Performs the measurement and logging of QoE metrics in accordance with the Metrics Reporting Configuration part of provisioning data, supplied by the 5GMSd Application Provider to the 5GMSd AF, and forwarded by the 5GMSd AF to the Media Player via the Media Session Handler.

- **DRM Client** (optional): When present, the DRM client might or might not be a part of the Media Player. It provides a content protection mechanism with its unique key management and key delivery system, authentication/‌authorization, policy enforcement and entitlement check. The DRM Client is not defined within 5G Media Streaming specifications.

- **Media Decryption** (optional): When present, media decryption is responsible to decrypt the media samples using the keys provided in the DRM license, and further passing to the Media Decoder to enable playback of encrypted media. The media decryption and media decoding could be implemented on a general-purpose processor in software or hardware or, for a more secure and robust architecture, the decryption, decoding and rendering could be implemented on the hardware of secure processors.

- **Media Decoder**: Decodes the media, such as audio or video.

- **Media Presentation and Rendering:** Presents the media using an appropriate output device and enables possible interaction with the media.

With respect to the Media Session Handler, Figure 4.2.2-2 below shows more detailed functional components of a UE to access the 5GMSd AF.



Figure 4.2.2-2: UE 5G Media Streaming Functions (Control-Centric)

NOTE 1: The yellow color indicates here that the 3GPP has created specifications for the function.

NOTE 2: A UE is a logical device which may correspond to the tethering of multiple physical devices or other types of realizations.

The following subfunctions are identified as part of a more detailed breakdown of Media Session Handler:

- **Core Functions:** Realization of a “session” concept for media communications, optionally spanning multiple stateless sessions. May optionally interact with network-based 5GMSd AFs.

- **Metrics Collection and Reporting:** executes the collection of QoE metrics measurement logs from the Media Player and sending of metrics reports to the 5GMSd AF.

- **Consumption Collection and Reporting:** executes the collection of content consumption measurement logs from the Media Player and sending of consumption reports to a 5GMSd AF about the currently consumed media within the available presentation, about the UE capabilities and about the environment of the media session for potential transport optimizations by the network or consumption report analysis.

- **Associated Delivery Procedures:** Functionalities, such as location filtering, provided by the 5GMSd Client to support the 5GMSd-Aware Application in the delivery of media presentations.

- **Network Assistance:** assisting functions provided to the 5GMSd Client and Media Player

NOTE 3: Based on such a decomposition, additional interfaces and APIs may exist in inside the UE:

- Media control interface(s) to configure and interact with the different UE media functions.

- Media control interface for media session management.

- Control interface for collection of logged QoE metrics measurements.

- Control interface for collection of logged content consumption measurements.

- Decoded media samples are handed over to the media renderer.

- Decrypted, compressed media samples are handed over to a trusted media decoder.

- In case of encryption, the encrypted, compressed media samples are handed over to the DRM Client.

NOTE 4: Non-Standalone, Roaming, Non-3GPP Access and EPC-5GC interworking aspects are FFS

END OF 2nd CHANGE

3rd CHANGE: Modifications to clause 4.3.1 and 4.3.2

### 4.3.1 Media Architecture

The 5GMSu Application Provider uses 5GMSu functions for uplink streaming services. It provides a 5GMSu-Aware Application on the UE the ability to make use of 5GMSu Client and network functions using 5GMSu interfaces and APIs.

*--- (snipped> ---*

The following interfaces are defined for 5G Uplink Media Streaming:

- M1u (5GMSu Provisioning API): External API, exposed by the 5GMSu AF to provision the usage of the 5G Media Streaming Uplink Streaming system and to obtain feedback.

- M2u (5GMSu Publish API): Optional External API exposed by the 5GMSu AS used when the 5GMSu AS in the trusted DN is selected to receive the content for the streaming service.

- M3u: (Internal and NOT SPECIFIED): Internal API used to exchange information for content hosting on a 5GMSu AS within the trusted DN.

- M4u (Uplink Media Streaming APIs): APIs exposed by a 5GMSu AS to the Media Streamer to stream media content.

- M5u (Media Session Handling API): APIs exposed by a 5GMSu AF to the Media Session Handler for media session handling, control and assistance that also include appropriate security mechanisms e.g. authorization and authentication, and QoE metrics reporting.

- M6u (UE Media Session Handling APIs): APIs that may be exposed by a Media Session Handler to the 5GMSu-Aware Application to make use of 5GMSu functions.

- M7u (UE Media Streamer APIs): APIs that may be exposed by a Media Streamer to the 5GMSu-Aware Application and Media Session Handler to make use of the Media Streamer, including configuration of QoE metrics to be measured and logged, and the collection of metrics measurement logs.

- M8u: (Application API): application interface used for information exchange between the 5GMSu-Aware Application and the 5GMSu Application Provider, for example to provide Service Access Information to the 5GMSu-Aware Aapplication. This API is external and not specified in the 5GMS architecture.

NOTE 7: Non-Standalone, Roaming, Non-3GPP Access and EPC-5GC interworking aspects are FFS.

### 4.3.2 UE Media Functions

The UE may include many detailed subfunctions that can be used individually or controlled individually by the 5GMSu-Aware Application. This clause breaks down several relevant identified subfunctions for which stage 3 specification is available.

The 5GMSu-Aware Application itself may include many functions that are not provided by the 5GMSu Client or to the 5G UE. Examples include peripheral discovery, notifications and social network integration. The 5GMSu-Aware Application may also include functions that are equivalent to ones provided by the 5GMSu Client and may only use a subset of the 5GMSu Client functions.

With respect to the Media Streamer and Media Handler functions, Figure 4.3.2-1 shows more detailed functional components of a 5GMSu Client.



Figure 4.3.2-1: UE 5G Uplink Media Streaming Functions

NOTE 1: A UE is a logical device which may correspond to the tethering of multiple physical devices or other types of realizations.

The following subfunctions are identified as part of a more detailed breakdown of the UE 5G Uplink Media Streaming functions:

- **5GMSu-Aware Application:** application which is out of scope of the present specification and which uses the UE 5G Uplink Media Streaming functions and APIs.

- **Media Capturing:** Devices, such as video cameras or microphones, that transform an analog media signal into digital media data.

- **Media Encoder(s):** Compress the media data.

- **Metrics Measurement and Logging:** execution of QoE metrics measurement and logging by the Media Streamer in accordance with the metrics configuration.

- **Metrics Collection and Reporting:** execution of the collection of QoE metrics measurement logs from the Media Streamer by the Media Session Handler for subsequent metrics reporting to the 5GMSu AF, in accordance with the metrics configuration.

- **Media Upstream Client:** encapsulates encoded media data and pushes it upstream.

NOTE 2: This maps to the FLUS media function in the FLUS Source specified in TS 26.238 Uplink Streaming stage 3 [5].

- **Network Assistance:** requests and/or subscribes to receive assistance information from one or more 5GMSu AF in support of the streaming process.

NOTE 3: This is expected to map to the FLUS Assistance function specified in TS 26.238 Uplink Streaming stage 3 [5].

- **Media Remote Control:** receives control commands from a 5GMSu AF.

NOTE 4: This is expected to map to the FLUS Remote control function specified in TS 26.238 Uplink Streaming stage 3 [5].

- **Core Function:** configures the 5GMSu AS for uplink streaming reception.

NOTE 5: This maps to the FLUS control function in the FLUS source specified in TS 26.238 Uplink Streaming stage 3 [5].

Here are the roles of the different APIs of the UE 5G Uplink Media Streaming functions:

- M6u: API used to control the Core Functions, Remote Controland Network Assistance functions.

- M7u: API used to configure, activate and stop the Media Capturing, Media Encoding(s) and Media Upstream Client functions. M7u also supports metrics configuration and the collection of metrics measurement logs.

3rd CHANGE: Modifications to clause 5.1

# 5 Procedures for Downlink Media Streaming

## 5.1 General

The downlink streaming procedures follow the general high-level workflow depicted in Figure 5.1‑1 below, starting from provisioningandingestsession preparation to the actual content streaming sessions. The **Ingest Session** refers to the time interval during which media content is uploaded to the 5GMSd AS. The **Provisioning Session** refers to the time interval during which the 5GMSd Client can access the media content and the 5GMSd Application Provider can control and monitor the media content and its delivery. Interactions between the 5GMSd AF and the 5GMSd Application Provider may occur at any time while the Provisioning Session is active.



Figure 5.1-1: High Level Procedure for downlink streaming

The 5GMSd provisioning API at M1d allows selection of media session handling (M5d) and media streaming (M4d) options, including whether the media content is hosted on trusted 5GMSd ASs. The selection is identified by a Provisioning Session identifier. The 5GMSd AF selects the M5d interface features according to the provisioning option. The Media Session Handling interface exposed by the 5GMSd AF can be used for core session handling; configuring content consumption measurement, logging, collection and reporting; configuring QoE metrics measurement, logging, collection and reporting; requesting different policy and charging treatments; or 5GMSd AF-based network assistance services.

When the media content is hosted by trusted Media ASs, then the 5GMSd AF selects and configures the 5GMSd AS. Interactions between a 5GMSd AF and a 5GMSd AS (M3d interactions) take place for 5GMS Ingest (M2d) and Media Streaming (M4d) resource reservations. The 5GMSd AS allocates M2d and M4d resources and communicates resource identifiers back to the 5GMSd AF. The 5GMSd AF provides information about the provisioned resources (in form of resource identifiers) for Media Session Handling (M5d), the 5GMSd Ingest (M2d) and the Media Streaming (M4d), to the 5GMSd Application Provider. The resource identifiers for Media Session Handling and Media Streaming are needed by the 5GMSd Client to access the 5GMSd functions.

When Content Hosting is provided by a 5GMSd AS in the external DN, then the M3d interface is not used and the 5GMSd AF does not provide 5GMS Ingest (M2d) and Media Streaming (M4d) resource reservations. M3d procedures are not standardized.

5GMSd Clients can (in principle) start streaming media as soon as the corresponding content is ingested by activating a unicast downlink streaming session. However, it may take some time until the media content is available for Media Streaming (via the Media Streaming API) or the distribution availability might be based on a provisioned schedule. The unicast downlink streaming session for a given UE (or "for each UE") is active from the time at which the 5GMSd-Aware Application activates the reception of a streaming service, until its termination.

The 5GMSd-Aware Application receives application data from the 5GMSd Application Provider before receiving the downlink streaming media. The application data contains Service Access Information, which acts as an entry point for the 5GMSd Client to start the downlink streaming session. The 5GMSd Client may either receive a reference to that Service Access Information or the full Service Access Information from the 5GMSd Application Provider.

Steps:

1. The 5GMSd Application Provider creates a Provisioning Session with the 5GMSd AF and starts provisioning the usage of the 5G Media Streaming System. During the establishment phase, the used features are negotiated and detailed configurations are exchanged. The 5GMSd AF receives Service Access Information for M5d (Media Session Handling) and, where media content hosting is negotiated, Service Access Information for M2d (Ingestion) and M4d (Media Streaming) as well. This information is needed by the 5GMSd Client to access the service. Depending on the provisioning, only a reference to the Service Access Information might be supplied.

2. When Content Hosting is offered and selected there may be interactions between the 5GMSd AF and the 5GMSd AS, e.g. to allocate 5GMSd content ingest and distribution resources. The 5GMSd AS provides resource identifiers for the allocated resources to the 5GMSd AF, which then provides the information to the 5GMSd Application Provider. The M3d procedures between 5GMSd AF and 5GMSd AS are not specified.

3. The 5GMSd Application Provider starts the Ingest Session by ingesting content. In case of live services, the content is continuously ingested. In case of on-demand streaming services, the content may be uploaded once and then updated later on.

NOTE 1: A 5GMSd AS in the external Data Network may provide the Content Hosting.

4. The 5GMSd Application Provider provides the Service Announcement Information to the 5GMSd-Aware Application. The service announcement includes either the whole Service Access Information (i.e. details for Media Session Handling (M5d) and for Media Streaming access (M4d)) or a reference to the Service Access Information or pre-configured information. When only a reference is included, the 5GMSd Client fetches (in step 6) the Services Access Information when needed.

5. When the 5GMSd-Aware Application decides to begin streaming, the Service Access Information (all or a reference) is provided to the 5GMSd Client. The 5GMSd Client activates the unicast downlink streaming session.

6. (Optional) In case the 5GMSd Client received only a reference to the Service Access Information, then it acquires the Service Access Information from the 5GMSd AF.

NOTE 2: Pre-caching of Service Access Information may also be supported by the 5GMS Client to speed up the activation of the service.

7. The 5GMSd Client uses the Media Session Handling API exposed by the 5GMSd AF at M5d. The Media Session Handling API is used for configuring content consumption measurement, logging, collection and reporting; configuring QoE metrics measurement, logging, collection and reporting; requesting different policy and charging treatments; or 5GMSd AF-based network assistance services. The actual time of API usage depends on the feature and interactions that may be used during the media content reception.

8. The 5GMSd Client activates reception of the media content.

END OF 3rd CHANGE

4th CHANGE: Modifications to clause 5.3.1

## 

## 5.3 Provisioning Session for Media Streaming

### 5.3.1 Domain model

The M1d baseline domain model is depicted in Figure 5.3.1-1 overleaf. It consists of a Provisioning Session, which contains at least one of the following:

- A Content Hosting Configuration,

- A Consumption Reporting Configuration which defines consumption measurement, logging, collection and reporting functionality,

- A Policy Template, or

- A Metrics Reporting Configuration which defines QoE metrics measurement, logging, collection and reporting functionality.

Each Provisioning Session is uniquely identified within the 5GMS System by a Provisioning Session identifier.

When a certain 5GMS feature is selected, the 5GMSd AF compiles the resulting Service Access Information so that the 5GMSd Client can access the services via M4d and/or M5d.

*--- <snipped> ---*

END OF 4th CHANGE

5th CHANGE: Modifications to clause 5.3.2

### 5.3.2 Baseline provisioning procedure

The present clause describes the baseline procedure to provision the features using the 5GMS System.

NOTE 1: SLA negotiations between the 5GMSd Application Provider and the 5GMS System provider are outside the scope of the present specification and are included in the figure below for illustrative purposes only.



Figure 5.3.2-1: High Level Procedure for provisioning the 5GMS System for downlink streaming sessions

Steps:

1. The 5GMSd Application Provider discovers the address (URL) of the 5GMSd AF (M1d) for Session Provisioning.

2. The 5GMSd Application Provider authenticates itself with the system. This procedure reuses existing authentication/authorization procedures, e.g. as defined for CAPIF [13].

3. The 5GMSd Application Provider creates a Provisioning Session, providing its 5GMSd Application Provider identifier as input. 5GMSd Application Provider queries the capabilities and authorized features.

4. The 5GMSd Application Provider specifies one or more 5GMSd features in the Provisioning Session. A set of authorized features is activated, such as content consumption measurement, logging, collection and reporting, QoE metrics measurement, logging, collection and reporting, dynamic policy, network assistance and content hosting (including ingest).

When the hontent hosting feature is offered and selected, the 5GMS Application Provider configures the content hosting behaviour of the 5GMSd AS. This Content Hosting Configuration is specified in clause 5.4 and includes selecting the ingest protocol and format, caching and proxying of media objects, content preparation, access protection (e.g. URL signing) and indicating a target distribution area (e.g. through geofencing).

When the dynamic policy feature is offered and selected, the 5GMSd Application Provider specifies a set of policies which can be invoked for the unicast downlink streaming session. The UE becomes aware of the selected policies in the form of a list of valid Policy Template Ids.

When the content consumption measurement, logging, collection and reporting feature is offered and selected, the 5GMSd Application Provider indicates the desired reporting interval. When the 5GMSd Application Provider has delegated Service Access Information handling to the 5GMS System, then location reporting is also selected or de-selected.

When the QoE metrics measurement, logging, collection and reporting feature is offered and selected, the 5GMSd Application Provider provides configuration input on the QoE post processing. When the 5GMSd Application Provider has delegated Service Access Information handling to the 5GMS System, then more detailed metrics reporting is configured.

5. When content hosting is desired, the 5GMSd AF interacts with the 5GMSd AS to allocate M2d resources and configure the ingest format. Then the 5GMSd AS responds with the M2d address. The 5GMSd AF selects the desired ingest format.

6. The 5GMSd AF compiles the Service Access Information. The Service Access Information contains access details and options such as the Provisioning Session identifier, M5d (Media Session Handling) addresses for content consumption measurement, logging, collection and reporting, QoE metrics measurement, logging, collection and reporting, dynamic policy, network assistance, etc. When content hosting is offered and has been selected in step 4, then also M4d (Media Streaming) information such as the DASH MPD is included.

7. The 5GMSd AF provides the results to the 5GMSd Application Provider.

a. When the 5GMSd Application Provider has selected full Service Access Information, then the results are provided in the form of addresses and configurations for M2d (Ingest), M5d (Media Session Handling) and M4d (Media Streaming).

b. When the 5GMSd Application Provider delegated the service access information handling to the 5GMS System, then a reference to the Service Access Information (e.g. an URL) is provided. The Media Session Handler fetches the full Service Access Information later from the 5GMSd AF.

8. When content hosting is offered and has been selected in step 4, the 5GMSd Application Provider can start supplying content at the M2d ingest interface. In the case of progressive download or on-demand DASH sessions, the 5GMSd Application Provider makes the content assets available. In the case of Live DASH streaming sessions, the 5GMSd Application Provider starts supplying the live content.

9. The 5GMSd Application Provider executes Service Announcement and updates the UEs (during the lifetime of the Provisioning Session).

Optional:

10. The 5GMSd Application Provider may update the Provisioning Session.

Depending on the parameters of the Provisioning Session:

11. The 5GMSd AF may send event-related or periodic notifications to the 5GMSd Application Provider.

According to schedule, or upon request:

12. The 5GMSd Application Provider may manually terminate the Provisioning Session (at any time). All associated resources are released. Content may be removed from the 5GMSd AS. The 5GMSd Application Provider may configure a schedule for Provisioning Session termination.

13. The 5GMSd AF sends a notification upon Provisioning Session termination.

The 5GMSd AF may request the creation or reuse of one or more network slices for distributing the content of the provisioned session. If more than one network slice is provisioned for the distribution of the content of a session, the list of allowed S‑NSSAIs shall be conveyed to the target UEs (e.g. through URSP or through M5d or M8d).

NOTE 2: The 5GMSd AS(s) serving the content are only accessible through the DNN(s) used by the network slice(s) provisioned for the distribution of that content.

END OF 5th CHANGE

6th CHANGE: Modifications to clause 6.1

# 6 Procedures for Uplink Media Streaming

## 6.1 General

The procedures for uplink media streaming allow a system user to create, modify, establish and delete sessions. Uplink media streaming sessions exist between a 5GMSu Client and a 5GMSu AS. The term **Sink Configuration** refers to the provisioned parameters of a 5GMSu AS. The term **Source Session** refers to the provisioned parameters in the 5GMSu Client.

The uplink streaming procedures follow a general high-level workflow, starting from provisioningto the actual uplink streaming sessions. The egest session refers to the time during which media content is uplink sstreamed into the 5GMSu AS. The provisioning session refers to the time period during which the 5GMSu Client is permitted to uplink stream media content. Interactions between the 5GMSu AF and the 5GMSu Application Provider may occur at any time while the Provisioning Session is active.

The 5GMSu Provisioning API allows selection of Media Session Handling (M5u) and Uplink Streaming (M4u) options, including whether the media content is published to trusted 5GMSu ASs. The 5GMSu AF selects the M5u interface according to the provisioning option. The Media Session Handling interface exposed by the 5GMSu AF can be used for remote control, metrics reporting, requesting different policy and charging treatments or other Network Assistance services.

*--- <snipped> ---*

END OF 6th CHANGE