**3GPPSA4 #121 S4-221290**

**Toulouse, 14-20 Nov 2022** *revision of S4-221142*

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **26**.**501** | **CR** | **0041** | **rev** | **1** | **Current version:** | **17.3.0** |  |
|  | | | | | | | | |
| *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)*.* | | | | | | | | |
|  | | | | | | | | |

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

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| ***Title:*** | **[5GMSA\_PH2] Uplink high level procedure** | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Tencent | | | | | | | | | |
| ***Source to TSG:*** | SA4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | 5GMS\_Ph2 | | | | |  | ***Date:*** | | | 8/09/2022 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***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-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | This document updates the following clauses:   * updates 6.1: Procedures for uplink streaming general subclause. This update uses the call flow of the most common collaboration scenario (uplink collaboration scenario 5 of TR 26.804) which is aligned with download streaming call flow defined in TS26.501 clause 5. For simplicity, the content preparation steps are eliminated. * adds 6 collaboration scenarios for uplink streaming that are documented in TR 26.804 in Annex A. The order of collaboration scenarios are changed since the first collaboration scenario (collaboration scenario 5 in TR 26.804) is used for the baseline call flow in clause 6.1 of TS 26.501. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | 1. 6.1 general clause of uplink streaming including:  * Update of the call flow and the steps * Editorial update of the text.  1. Collaboration scenarios for uplink streaming | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The current specification is incomplete. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 6, A | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | | Rev 1: Improved the call-flows and the language | | | | | | | | |

CHANGE

# 6 Procedures for Uplink Media Streaming

## 6.1 General

The procedures for uplink media streaming allow a 5GMSu Application Provider to create, modify, establish and delete sessions. Uplink media streaming sessions exist between a 5GMSu Client and a 5GMSu AS.

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 period during which media content is uplink streamed to the 5GMSu AS and optionally egested from there to the 5GMS Application Provider. The **P**rovisioning **Session** refers to the time period during which the 5GMSu Client is permitted to upload 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 the 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 5GMSu AF-based Network Assistance.

When the 5GMSu AF and 5GMSu AS reside in the same DN, then the 5GMSu AF selects the 5GMSu AS. Interactions between a 5GMSu AF and a 5GMSu AS (M3u interactions) take place for Content Egest (M2u) and Uplink Streaming (M4u) resource reservations. The 5GMSu AS allocates M2u and M4u resources and communicates resource identifiers back to the 5GMSu AF. The 5GMSu AF provides information about the provisioned resources (in the form of resource identifiers) for Media Session Handling, Content Egest, and Uplink Streaming to the 5GMSu Application Provider. The resource identifiers for Media Session Handling and Uplink Streaming are needed by the 5GMSu Client to access the selected features.

When 5GMSu AF and 5GMSu AS are operated by different providers, then the M3u interface is not used and the 5GMSu AF does not provide Content Egest (M2u) and Uplink Streaming (M4u) resource reservations. M3u procedures are not specified.

5GMSu Client can (in principle) start the uplink streaming by activating its uplink streaming session. The uplink streaming session for a given UE (or for each UE) is active from the time at which the 5GMSu-Aware Application activates the transmission of an uplink streaming service until its termination.

The 5GMSu-Aware Application receives application metadata from the 5GMSu Application Provider before transmitting the uplink streaming media. The application metadata contains Service Access Information, which acts as an entry point for the 5GMSu Client to start the uplink streaming session. The 5GMSu Client may either receive the Service Access Information from the 5GMSu Application Provider (using a not standardized interface) or instructions for a remote control session. When remote control is activated, then the 5GMSu Client is remotely configured and controlled by a 5GMSu AF.

Figure 6.1-1 provides a basic high-level call flow for uplink streaming. The corresponding collaboration scenario is defined in clause A.10.



Figure 6.1-1: High level call flow for uplinking streaming

Steps:

1. The 5GMSu Application Provider provisions the 5GMSu AF at reference point M1u, including a Content Publishing Configuration for content egest and, optionally, Content Preparation Templates.

2. Depending on the provisioned Content Publishing Configuration, the 5GMSu AF might need to interact with the 5GMSu AS to confirm the availability of resources for content preparation.

At some later point in time:

3. The 5GMSu Application Provider provides Service Access Information to the 5GMS-Aware Application at reference point M8u.

4. When the 5GMSu-Aware Application decides to activate the streaming service transmission, the Service Access Information is provided to the 5GMSu Client.

5. The 5GMSu Client requests the 5GMSu AF to initialise uplink media streaming (M5u).

Alternatively:

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

7. The 5GMSu Client requests Service Access Information from the 5GSMu AF at reference point M5u.

Then:

8. If remote control is activated, the 5GMSu AF configures and controls, via M5u, the Media Remote Control sub-function of the 5GMSu Client.

9. The 5GMSu Client starts the Egest Session by activating the uplink streaming session.

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

11. If content preparation was provisioned in step 1, the uplinked media may be manipulated by the 5GMSu AS prior to egest.

12. Media streaming egest starts from the 5GMSu AS to the 5GMSu Application Provider at reference point M2u.

Clauses A.11 to A.15 define additional collaboration scenarios for uplink streaming. The call flow for each collaboration scenario is also included in each clause.

CHANGE

Annex A (informative):  
Usage Guidelines for collaboration scenarios

# A.0 General

This annex describes a set of collaboration scenarios and deployment options of the 5G Media Streaming architecture. The intention is to illustate different deployment options.

Note that the scenarios focus on the ownership of the functions. Scalability realizations such as a CDN are not illustrated. As result of the scalability considerations, the M4-serving 5GMS AS and/or M5-serving 5GMS AF:

- May consist of multiple (physical) servers, which may be addressed using a single FQDN. A load balancer forwards client requests to one of these servers. Forwarding may be via HTTP redirects or transparent towards the client.

- May consist of multiple (physical) servers, where different servers, or different groups of servers, may be addressed with different FQDNs. The client may be made aware of this via the manifest (i.e. listing multiple base URLs).

NOTE: In this case the servers may be managed by the same or different parties (e.g. MNO and/or 5GMS Application Provider).

- May be addressed with a single FQDN. For example, the MNO AS is mostly transparent and acts as a proxy/cache.

NOTE: In every collaboration scenario of this Annex, any step which differs from the baseline call flow is shown in **bold text**.

# A.1 Downlink media streaming with AS deployed in an external Data Network (OTT)

The collaboration scenario shown in figure A.1-1 represents a typical OTT collaboration scenario, where only the 5GMSd AS is deployed and which resides in an external Data Network. In this collaboration scenario, neither the 5GMSd AF nor the Media Session Handler function of the 5GMSd Client is present/necessary for downlink media streaming operation. All Service Announcement Information is delivered at reference point M8d from the 5GMSd Application Provider to the 5GMSd-Aware Application. The latter then passes the Service Acess Information contained in the service announcement to the Media Player to enable downstream media streaming session establishment and media transfer. In addition, M8d is used for UE application-level data reporting from the 5GMSd Aware Application to the 5GMSd Application Provider. The Provisioning API (M1d′) and Ingest API (M2d′) may follow 5GMS specifications.(SNIPPED)

Figure A.1-1: Downlink media streaming with AF and AS in an external Data Network

(SNIPPED)

# A.2 Downlink media streaming with both AF and AS deployed in the trusted Data Network

The collaboration scenario shown in figure A.2-1 represents a MNO CDN scenario, where the CDN is used for ingest and delivery of the content. In this collaboration scenario, similar to that in clause A.1, the Media Session Handler is not present/necessary for downlink media streaming operation since all Service Access Information is delivered at reference point M8d from the 5GMSd Application Provider to the 5GMSd-Aware Application, and in turn the Service Access Information is passed to the Media Player. Similarly, M8d is used for UE application-level data reporting from the 5GMSd-Aware Application to the 5GMSd Application Provider. The 5GMSd AF is present in this scenario to obtain Service Access Information from the 5GMSd Application Provider (at M1d), and in turn, passes that information to the 5GMSd AS.

(SNIPPED)

Figure A.2-1 : Downlink media streaming with AF and AS in the trusted Data Network

(SNIPPED)

# A.3 Downlink media streaming with both AF and AS deployed in an external Data Network (OTT)

The collaboration scenario shown in figure A.3-1 represents a typical OTT collaboration scenario, where the 5GMSd AF and 5GMSd AS are deployed in an external Data Network. The 5GMSd AF interacts with the NEF via N33. The Provisioning API (M1d′) and Ingest API (M2d′) may follow 5GMS specifications.

(SNIPPED)

Figure A.3-1: Downlink media streaming with AF and AS in an external Data Network (OTT)

(SNIPPED)

# A.4 Downlink media streaming with AF deployed in the trusted Data Network and AS deployed in an external Data Network

The collaboration scenario shown in figure A.4-1 depicts a content hosting function in the external Data Network, e.g. using a third-party CDN in collaboration with MNO offered assistance and network services. The Provisioning API (M1d′) and Ingest API (M2d′) may follow 5GMS specifications.

(SNIPPED)

Figure A.4-1: Downlink media streaming with AF in the trusted Data Network and AS in external Data Network

(SNIPPED)

# A.5 Downlink media streaming with AS deployed in an external Data Network, provisioned by AF deployed in the trusted Data Network

The collaboration scenario shown in figure A.5-1 is similar to that depicted in clause A.4 with the difference that the external content hosting function (5GMSd AS) is provisioned from a 5GMSd AF which is located in a trusted Data Network. It is expected that a 5GMSd AF and 5GMSd AS from different providers are interconnected using an M3d interface. The Ingest API (M2d′) may follow 5GMS specifications.

(SNIPPED)

Figure A.5-1: Downlink media streaming with AS in external Data Network, provisioned by AF in the trusted Data Network

(SNIPPED)

# A.6 Downlink media streaming with AS deployed in the trusted Data Network, provisioned by AF deployed in an external Data Network

The collaboration scenario shown in figure A.6-1 is similar to those depicted in clauses A.4 and A.5 with the difference that the trusted content hosting function (5GMSd AS) is provisioned from an external 5GMSd AF. It is expected that a 5GMSd AF and 5GMSd AS from different providers are interconnected using an M3d interface. The Provisioning API (M1d′) may follow 5GMS specifications.

(SNIPPED)

Figure A.6-1: Downlink media streaming with AS in the trusted Data Network, provisioned by AF in external Data Network

(SNIPPED)

# A.7 Downlink media streaming with both AF and AS deployed in the trusted Data Network and AF interaction with PCF

The collaboration scenario shown in figure A.7-1 represents a MNO CDN scenario (like in Collaboration 2) where the CDN is used for ingest and delivery of the content. Additional 5GMS features are used which require interaction with the PCF.

(SNIPPED)

Figure A.7-1: Downlink media streaming with AF and AS in the trusted Data Network

(SNIPPED)

# A.8 Downlink media streaming with AFs deployed in two separate trusted Data Networks sharing AS in an external Data Network

The collaboration scenario shown in figure A.8-1 represents a multi-MNO distribution scenario where an external CDN (5GMSd AS) is used to deliver content through multiple 5GMSd capable PLMNs. Additional 5GMSd features are used from the serving 5GMS System which need interactions with the PCF of the serving PLMN. The Provisioning API (M1d′) and Ingest API (M2d′) may follow 5GMS specifications.

(SNIPPED)

Figure A.8-1: Downlink media streaming with AFs in two trusted Data Networks sharing AS in external Data Network

(SNIPPED)

# A.9 Downlink media streaming with both AF and AS deployed in external Data Network and AS delivering content through two trusted Data Networks (OTT)

The collaboration scenario shown in figure A.9-1 represents a multi-MNO distribution scenario where an external CDN (5GMSd AS) is used to deliver content through multiple 5GMSd-capable PLMNs. Additional 5GMSd features are used from the serving 5GMSd system which need interactions with the NEF of the serving PLMN. The Provisioning API (M1d′) and Ingest API (M2d′) may follow 5GMS specifications.

(SNIPPED)

Figure A.9-1: Downlink media streaming with AF and AS in external Data Network delivering through two trusted Data Networks (OTT)

(SNIPPED)

# A.10 Uplink media streaming using content preparation with both AF and AS deployed in the trusted Data Network

In this collaboration scenario shown in figure A.10-1, both the 5GMSu AS and 5GMSu reside in the trusted Data Network. Additionally, reference point M2u is used for content egest to the external 5GMSu Application Provider.



Figure A.10-1: Uplink media streaming with AF and AS in trusted Data Network

Figure A.10‑2 provides a high-level call flow for this collaboration scenario.



Figure A.10-2: Call flow for uplink media streaming using content preparation with AF and AS in trusted Data Network

Steps:

1. The 5GMSu Application Provider creates a Provisioning Session with the 5GMSu AF.

**2. The 5GMSu Application Provider requests the 5GMSu AF to create one Content Publishing Configuration that defines the instructions for content egest (M1u).**

**3. The 5GMSu AF, based on the received Content Publishing Configuration, requests the 5GMSu AS to confirm the availability of content resources for content preparation.**

**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 provides Service Access Information to the 5GMS-Aware Application at reference point M8u.

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

**7. The 5GMSu Client requests that the 5GMSu AF initialises uplink media streaming, including any content preparation required by the Content Publishing Configuration (M5u).**

Alternatively:

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

9. The 5GMSu Client requests Service Access Information from the 5GSMu AF at reference point M5u.

As a consequence:

**10. The 5GMSd AF requests initialisation of the content preparation process (M3u).11. The 5GMSd AS initialises the content preparation process, if is not already running (M3u).**

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

Then:

13. If remote configuration and control is activated, the 5GMSu AF configures and controls the 5GMSu Client remotely (M5u).

14. The 5GMSu Client performs media session handling for the uplink streaming session.

15. Uplink media streaming starts from the 5GMSu Client to the 5GMSu AS (M4u).

**16. If content preparation was initialized at step 11 or before, the uplinked media may be manipulated by the 5GMSu AS prior to egest.**

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

Finally:

**18. The 5GMSu AS releases its resources after observing a period of interactivity.**

NOTE: This step is implementation dependent.

# A.11 Uplink media streaming using content preparation (media plane only) with both AF and AS deployed in the trusted Data Network

This uplink collaboration scenario pertains to a media plane only collaboration for which the 5GMSu AS is deployed in the trusted Data Network. Here, the 5GMS System is assumed to offer uplink streaming capabilities as a service to an external 5GMSu Application Provider. This collaboration scenario is analogous to the scenario in A.2 in terms of the use of M8u (as opposed to M8d in A.2) for the delivery of Service Access Information from the 5GMSu Application Provider to the 5GMSu Client via the 5GMSu Aware Application, and the reporting of UE application data from the 5GMSu Aware Application to the 5GMSu Application Provider.



Figure A.11-1: Uplink media streaming (media plane only) with AF and AS in the trusted Data Network

NOTE: Although provisioning at reference point M1 is shown in figure A.11-1 between the (external) 5GMSu Application Provider and the 5GMSu AF, due to the absence of reference point M5u in this diagram, there is no control plane collaboration between the 5GMSu Application Provider and the 5GMS System.

Figure A.11‑2 provides a high-level call flow for this collaboration scenario.



Figure A.11-2: Uplink media streaming using content preparation (media plane only) with AF and AS in the trusted Data Network

Steps:

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

**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 Content Publishing Configuration, requests the 5GMSu AS to instantiate the content preparation process (M3u).**

**4. The 5GMSu AS initialises the content preparation process.**

**5. The 5GMSu AS acknowledges the initialisation of the required process (M3u).**

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

At some later point in time:

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

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

9. Uplink media streaming starts from the 5GMSu Client to the 5GMSu AS (M4u).

**10. If content preparation was initialized in step 4, the uplinked media may be manipulated by the 5GMSu AS prior to egest.**

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

Finally:

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

NOTE: This step is implementation-dependent.

# A.12 Uplink media streaming using content preparation (media plane only) with provisioning and AS in the external domain

This scenario pertains to a media plane only collaboration for which the 5GMSu AS is deployed in the external domain and the 5GMSu AF is not involved. Specifically, reference points M1′ and/or M2u′ do not follow 3GPP specifications. This collaboration scenario is analogous to the scenario in A.1 in that neither the 5GMSu AF nor the Media Session Handler function of the 5GMSu Client is present/necessary for uplink media streaming operation. Similar to the collaboration scenario in A.11, M8u is used for the delivery of Service Access Information from the 5GMSu Application Provider to the 5GMSu Client via the 5GMSu Aware Application, and the reporting of UE application data from the 5GMSu Aware Application to the 5GMSu Application Provider. The Provisioning API (M1u′) and Ingest API (M2u′) may follow 5GMS specifications.



Figure A.12-1: Uplink media streaming (media plane only) with provisioning and AS in the external domain

Figure A.12‑2 provides a high-level call flow for this collaboration scenario.



Figure A.12-2: Call flow for Uplink media streaming using content preparation (media plane only) with provisioning 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 Provisioning function requests the 5GMSu AS to initialise the required content preparation process (M3u′).**

**3. The 5GMSu AS initialises the content preparation process.**

**4. The 5GMSu AS acknowledges the initialisation of the required process (M3u′).**

5. The Provisioning function acknowledges the successful creation of the Provisioning Session to the 5GMSu Application Provider (M1u′).

At some later point in time:

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

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

8. Uplink media streaming starts from the 5GMSu Client to the 5GMSu AS (M4u).

**9. If content preparation was initialized in step 3, the uplinked media may be manipulated by the 5GMSu AS prior to egest.**

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

Finally:

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

NOTE: This step is implementation-dependent.

# A.13 Uplink media streaming using content preparation with AF in the trusted Data Network and AS in the external domain

In this collaboration scenario, both the 5GMSu AS and 5GMSu AF are present. The 5GMSu AS resides in the external domain. While it employs 5GMS protocol and format for uplink media reception from the 5GMSu Client (M4u), norit performs content egest to the 5GMSu Application Provider over a M2u-like (M2u’) protocol and format (and therefore it is called 5GMSu-like AS). The 5GMSu AF is used to interact with the 5GMSu Application Provider at the reference point M1 for uplink media streaming provisioning System, and to interact with the Media Session Handler of the 5GMSu Client for providing Service Access Information, dynamic policy invocation and/or other uplink media streaming related functionality such as metrics reporting and network assistance). The Provisioning API (M1u′) and Ingest API (M2u′) may follow 5GMS specifications.



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

Figure A.13‑2 provides a high-level call flow for this collaboration scenario.



Figure A.13-2: Call flow for uplink media streaming using content preparation with AF in the trusted Data Network and AS in the external domain

Steps:

1. The 5GMSu Application Provider creates a Provisioning Session with its internal Provisioning function (M1u′).

**2. The Provisioning function requests the 5GMSu-like AS to initialise the required content preparation process instantiation (M3u′).**

**3. The 5GMSu-like AS instantiates the content preparation process.**

**4. The 5GMSu-like AS acknowledges the Provisioning the instantiation of required process (M3u′).**

5. The Provisioning function acknowledges successful provisioning to the 5GMSu Application Provider (M1u′).

6. The 5GMSu Application Provider creates a Provisioning Session for uplink streaming with the 5GMSu AF.

At some later point in time:

7. The 5GMSu Application Provider provides Service Access Information to the 5GMS-Aware Application at reference point M8u.

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

**9. 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:

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

11. The 5GMSu Client requests Service Access Information from the 5GSMu AF at reference point M5u.

At some later point in time:

12. If remote configuration and control is activated, the 5GMSu AF configures and controls the 5GMSu Client remotely (M5u).

13. Uplink media streaming starts from the 5GMSu Client to the 5GMSu-like AS (M4u′).

**14. If content preparation was initialized in step 3, the uplinked media may be manipulated by the 5GMSu AS prior to egest.**

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

Finally:

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

NOTE: This step is implementation dependent.

# 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 cotent 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. If remote configuration and control is activated, the 5GMSu AF configures and controls the 5GMSu Client remotely (M5u).

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

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

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

Finally:

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

NOTE: This step is implementation-dependent.

# A.15 Hybrid uplink and downlink media streaming using content preparation

This scenario represents a hybrid end-to-end form of collaboration across uplink media streaming and downlink media streaming services. An external 5GMS Application Provider relies on the 5GMS System to support both the uplink streaming media transmission by 5GMSu Clients and subsequent distribution of that content via downlink media streaming for reception by 5GMSd Clients within the same 5GMS System.



Figure A.15-1: Hybrid uplink and downlink media streaming

Figure A.15-2 shows the call flow for this scenario. To simplify the call flow, the content preparation process is omitted.



Figure A.15-2: Call flow for hybrid uplink and downlink media streaming using content preparation

Steps:

1. The 5GMSd Application Provider creates a Provisioning Session with the 5GMSd AF (M1d).

2. The 5GMSd Application Provider provisions the 5GMSD AF with a Content Hosting Configuration.

3. The 5GMSdAF, based on the received Content Hosting Configuration, requests the 5GMSd AS to confirm the availability of distribution resources (M3d, procedures not specified).

4. The 5GMSd AF acknowledges to the 5GMSd Application Provider the successful creation of the Content Hosting Configuration (M1d).

5. The 5GMS Application Provider creates a Provisioning Session with the 5GMSu AF (M1u).

**6. The 5GMSu AF requests the 5GMSu AS to confirm the uplink resources availability. (M3u, procedures not specified).**

7. The 5GMSu AF acknowledges to the 5GMSu Application Provider of the successful provisioning (M1u).

At some later point in time:

8. The 5GMSu Application Provider provides Service Access Information to the 5GMS-Aware Application at reference point M8u.

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

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

Alternatively:

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

12. The 5GMSu Client requests Service Access Information from the 5GSMu AF at reference point M5u.

At some later point in time:

13. If remote configuration and control is activated, the 5GMSu AF configures and controls the 5GMSu Client remotely (M5u).

14. Uplink media streaming starts from the 5GMSu Client to the 5GMSu-like AS (M4u′).

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

**16. If content preparation was provisioned in step 6, the uplinked media may be manipulated by the 5GMSu AS prior to being streamed to the 5GMSd AS.**

17. The 5GMSu AS streams the content to the 5GMSd AS (I2, not specified).

Steps 18–22 concern the 5GMS downlink streaming process:

18. The 5GMS Application Provider optionally provides the service access information to the 5GMSd-Aware Application (M8d).

19. The 5GMS-Aware Application requests the 5GMSd Client to start an uplink streaming session (M6d/M7d).

20. If Service Access Information was not provided in step 14, the 5GMSd Client requests this information from the 5GSMd AF (M5d).

21. The 5GMSd Client requests the start of the downlink streaming session from the 5GSMd AF (M5d).

22. The downlink media streaming starts (M4d).

Finally:

**23. The 5GMSu AS releases its uplink content preparation resources after observing a period of interactivity.**

**24. The 5GMSd AS releases its downlink contnent preparation resources after observing a period of interactivity.**

NOTE: Steps 23 and 24 are implementation-dependent.

END OF CHANGES