**3GPP TSG-S4 Meeting #126*****S4-231629***

**Chicago, United States of America, 13th–17th November 2023** revision of S4aI230161

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| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **26.501** | **CR** | **0078** | **rev** | **2** | **Current version:** | **18.3.1** |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network | **X** |

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| ***Title:*** |  | | | | | | | | | |
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| ***Source to WG:*** | BBC, Tencent | | | | | | | | | |
| ***Source to TSG:*** | S4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | 5GMS\_Ph2 | | | | |  | ***Date:*** | | | 2023-11-01 |
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| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-18 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
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| ***Reason for change:*** | | Document additional realisation of this collaboration in which the 5GMSd AS is provisioned to consume directly from the 5GMSu AS rather than having to reflect the content via the 5GMS Application Provider. | | | | | | | | |
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| ***Summary of change:*** | | * Added missing steps to original call flow. * Additional call flow sequence diagram and description of steps. | | | | | | | | |
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| ***Consequences if not approved:*** | | 5GMS Application Providers may be unaware of this optimisation which reduces the barrier of entry for deploying services that use this collaboration. | | | | | | | | |
| ***Q*** | |  | | | | | | | | |
| ***Clauses affected:*** | | A.15, A.15.1 (new), A.15.2 (new), A.15.3 (new) | | | | | | | | |
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|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | |  | | |
| ***affected:*** | |  | **X** | Test specifications | | | |  | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | |  | | |
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| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | | CR0078r1 [S4aI230161]:   * Renamed "hybrid" to "cascaded" in all scenarios. * Provided introductory explanation in clause A.15.1 that the scenarios are not mutually exclusive. * Removed scenario in clause A.15.4 with internal content re-ingestion.   CR0078r2 [S4-231629]:   * Resubmitted postponed contribution verbatim. | | | | | | | | |

FIRST CHANGE

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

## A.15.1 Introduction

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 redistribution of that content via downlink media streaming for reception by 5GMSd Clients within the same 5GMS System.

Two distinct methods are described in the following clauses.

- In the first method (clause A.15.2) the content contributed to the 5GMSu AS using uplink media streaming is transferred indirectly to the 5GMSd AS via a 5GMS Application Provider for redistribution using downlink media streaming.

- In the second method (clause A.15.3) the content contributed to the 5GMSu AS using uplink media streaming is transferred directly from the 5GMSu AS to the 5GMSd AS without any intermediary.

These two methods are not mutually exclusive. For example, content transferred using the second method may also be egested to a 5GMSu Application Provider for subsequent redistribution by other 5GMS Systems and/or non-3GPP distribution systems.

## A.15.2 Cascaded uplink and downlink media streaming using content preparation with external content re-ingestion

In a first variant of this collaboration scenario, content contributed to the 5GMS System by the 5GMSu Client is egested by the 5GMSu AS at reference point M2u (by either push- or pull-based means) and subsequently ingested by the 5GMSd AS from the 5GMS Application Provider at reference point M2d (by either push- or pull-based means).

NOTE: For redistribution with the lowest possible latency, the provisioning of both push-based egest and push-based ingest are recommended.



Figure A.15.2-1: Cascaded uplink and downlink media streaming with external content re-ingestion

Figure A.15-2 shows the call flow for this scenario. (To simplify the call flow, the details of the content preparation process are omitted.)



Figure A.15.2-2: Call flow for cascaded uplink and downlink media streaming using content preparation with external content re-ingestion

Steps:

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

1a. The 5GMS Application Provider may provision the 5GMSd AF with a Content Preparation Template (M1d).

2. The 5GMSd Application Provider provisions the 5GMSd AF with a Content Hosting Configuration. The ingest configuration indicates that content will be ingested from the 5GMS Application Provider by either pull- or push-based means. If a Content Preparation Template was provisioned in the previous step, the Content Hosting Configuration may reference it.

3. The 5GMSd AF, based on the provisioned Content Hosting Configuration and Content Preparation Template, requests the 5GMSd AS to confirm the availability of content distribution resources (M3d).

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):

5a. The 5GMS Application Provider may provision the 5GMSu AF with a Content Preparation Template (M1u).

5b. The 5GMS Application Provider provisions the 5GMSu AF with a Content Publishing Configuration (M1u). The egest configuration indicates that contributed content will be made available to the 5GMS Application Provider by either pull- or push-based means. If a Content Preparation Template was provisioned in the previous step, the Content Publishing Configuration may reference it.

**6. The 5GMSu AF, based on the provisioned Content Hosting Configuration and Content Preparation Template (if any) requests the 5GMSu AS to confirm the availability of content contribution resources (M3u).**

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

NOTE: In this variant of the collaboration scenario the order of downlink media streaming provisioning (steps 1–4) and uplink media streaming provisioning (steps 5–7) may be reversed.

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

14. The 5GMSu Client invokes media session handling procedures during the uplink media streaming session (M5).

**15. If content preparation was provisioned in step 5, the uplinked media may be manipulated by the 5GMSu AS prior to being egested by it.**

NOTE: Steps 13–16a may continue in parallel to steps 16b and 21.

16a. The 5GMSu AS egests the content to the 5GMS Application Provider (M2u) by pull- or push-based means according to the Content Publishing Configuration provisioned in step 5b.

16b: The 5GMSd AS ingests the content from the 5GMS Application Provider (M2d) by pull- or push-based means according to the Content Hosting Configuration provisioned in step 3.

Steps 17–21 concern the 5GMS downlink streaming process:

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

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

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

20. Void.

21. Downlink media streaming starts from the 5GMSd AS to the 5GMSd Client (M4d).

Finally:

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

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

NOTE: Steps 22 and 23 are implementation-dependent.

## A.15.3 Cascaded uplink and downlink media streaming using content preparation with direct content re-ingestion

In a second variant of this collaboration scenario, content contributed to the 5GMS System by the 5GMSu Client is egested by the 5GMSu AS at reference point M2u (by either push- or pull-based means) and directly ingested by the 5GMSd AS at reference point M2d (with push- or pull-based content ingest provisioned the same way as for the corresponding content egest). The content thus bypasses the external 5GMS Application Provider altogether.

NOTE 1: Although not depicted, the 5GMSd AS in this collaboration acts as 5GMSu Application Provider for the 5GMSu AS to target. Conversely, the 5GMSu AS acts as 5GMSd Application Provider supplying content to the 5GMSd AS.

NOTE 2: For redistribution with a lower possible latency, the provisioning of push-based content egest and ingest is recommended.



Figure A.15.3-1: Cascaded uplink and downlink media streaming with direct content re-ingestion

Figure A.15-2 shows the call flow for this scenario when push-based egest/ingest is used for direct content re-ingestion. (To simplify the call flow, the details of the content preparation process are omitted.)



Figure A.15.3-2: Call flow for cascaded uplink and downlink media streaming using content preparation with direct push-based content re-ingestion

The steps for this call flow are identical to those in clause A.15.2 except for the following:

2. The 5GMSd Application Provider provisions the 5GMSd AF with a Content Hosting Configuration. The ingest configuration indicates that content will be ingested from the **5GMSu AS** by push-based means. If a Content Preparation Template was provisioned in the previous step, the Content Hosting Configuration may reference it.

4. The 5GMSd AF acknowledges to the 5GMSd Application Provider the successful creation of the Content Hosting Configuration (M1d). **The acknowledgement includes the ingest base URL on the 5GMSd AS to which downlink media streaming content is to be pushed.**

5b. The 5GMS Application Provider provisions the 5GMSu AF with a Content Publishing Configuration (M1u). The egest configuration indicates that contributed content will be made available to the **5GMSd AS** by push-based means. **The egest destination is specified to be the base URL on the 5GMSd AS returned in prior step 4.** If a Content Preparation Template was provisioned in the previous step, the Content Publishing Configuration may reference it.

16. The 5GMSu AS egests the content (M2u) by push-based means according to the Content Publishing Configuration provisioned in step 5b **and the 5GMSd AS directly ingests the content by the same means (M2d) according to the Content Hosting Configuration provisioned in step 2**.

If pull-based egest/ingest is instead used between the 5GMSu AS and the 5GMSd AS, the order of the provisioning (steps 1–4 and 5–7 of figure A.15.3-2) is reversed to the order shown in figure A.15.3‑3 with uplink streaming provisioned before downlink streaming:



Figure A.15.3-3: Call flow for cascaded uplink and downlink media streaming using content preparation with direct pull-based content re-ingestion

The steps for this call flow are identical to those in clause A.15.2 except for the following:

5b. The 5GMS Application Provider provisions the 5GMSu AF with a Content Publishing Configuration (M1u). The egest configuration indicates that contributed content will be made available to the **5GMSd AS** by pull-based means. If a Content Preparation Template was provisioned in the previous step, the Content Publishing Configuration may reference it.

7. The 5GMSu AF acknowledges successful provisioning to the 5GMSu Application Provider (M1u). **The acknowledgement includes the egest base URL on the 5GMSu AS from which contributed uplink media streaming content will be made available.**

2. The 5GMSd Application Provider provisions the 5GMSd AF with a Content Hosting Configuration. The ingest configuration indicates that content will be ingested from the **5GMSu AS** by pull-based means **from the egest base URL on the 5GMSu AS returned in prior step 7**. If a Content Preparation Template was provisioned in the previous step, the Content Hosting Configuration may reference it.

16. The 5GMSu AS makes the content available for pull-based egest (M2u) according to the Content Publishing Configuration provisioned in step 5b **and the 5GMSd AS directly ingests the content by the same means (M2d) according to the Content Hosting Configuration provisioned in step 2**.

END OF CHANGES