**3GPP TSG SA WG4#116e S4-211347**

**E-meeting, 10th – 19th November 2021**

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| *CR-Form-v12.0* |
| **DRAFT CHANGE REQUEST** |
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|  | **26**.**501** | **CR** | draft | **rev** |  | **Current version:** | **16.8.0** |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network | **X** |

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| ***Title:***  | **[5MBUSA] 5GMS via eMBMS** |
|  |  |
| ***Source to WG:*** | Qualcomm Incorporated |
| ***Source to TSG:*** |  |
|  |  |
| ***Work item code:*** | 5MBUSA |  | ***Date:*** | 03/11/2021 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | 17  |
|  | *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 canbe 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:*** | See work item  |
|  |  |
| ***Summary of change:*** | Add 5GMS via eMBMS |
|  |  |
| ***Consequences if not approved:*** | Work Item objectives not complete |
|  |  |
| ***Clauses affected:*** | 2, 5.10 (new) |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** | **X** |  |  Other core specifications  | TS/TR ... CR  |
| ***affected:*** |  |  |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  |  |  O&M Specifications | TS/TR ... CR ...  |
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| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

**===== CHANGE =====**

# 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*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 23.501: "System architecture for the 5G System (5GS)".

[3] 3GPP TS 23.502: "Procedures for the 5G System (5GS)".

[4] 3GPP TS 23.503: "Policy and charging control framework for the 5G System (5GS); Stage 2".

[5] 3GPP TS 26.238: "Uplink streaming".

[6] 3GPP TS 26.307: "Presentation layer for 3GPP services".

[7] 3GPP TS 26.247: "Transparent end-to-end Packet-switched Streaming Service (PSS); Progressive Download and Dynamic Adaptive Streaming over HTTP (3GP-DASH)".

[8] 3GPP TS 26.234: "Transparent end-to-end Packet-switched Streaming Service (PSS); Protocols and codecs".

[9] 3GPP TS 23.003: "Technical Specification Group Core Network and Terminals; Numbering, addressing and identification".

[10] 3GPP TS 28.530: "Management and orchestration; Concepts, use cases and requirements".

[11] 3GPP TS 28.531: "Management and orchestration; Provisioning".

[12] 3GPP TS 28.541: "Management and orchestration; 5G Network Resource Model (NRM); Stage 2 and stage 3".

[13] 3GPP TS 23.222: "Common API Framework for 3GPP Northbound APIs".

[14] IETF RFC 1034: "Domain names – concepts and facilities".

[15] 3GPP TS 23.246: "Multimedia Broadcast/Multicast Service (MBMS); Architecture and functional description".

[16] 3GPP TS 26.346: "Multimedia Broadcast/Multicast Service (MBMS); Protocols and codecs".

[17] 3GPP TS 26.347: "Multimedia Broadcast/Multicast Service (MBMS); Application Programming Interface and URL".

[18] 3GPP TS 26.348: "Northbound Application Programming Interface (API) for Multimedia Broadcast/Multicast Service (MBMS) at the xMB reference point".

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### 4.2.4 5GMS via eMBMS

#### 4.2.4.1 Architecture for 5G Media Streaming over eMBMS

Figure 4.2.4.1-1 below depicts an architecture for downlink 5G Media Streaming via eMBMS.



Figure 4.2.4.1-1: Architecture for 5G Media Streaming over eMBMS

This arrangement allows 5GMS-based downlink media streaming to be deployed as an MBMS-aware Application on top of eMBMS as defined in TS 23.246 [15], TS 26.346 [16], TS 26.347 [17] and TS 26.348 [18].

In this case:

- The 5GMSd AF and 5GMSd AS shall set up the delivery of 5GMSd content to an MBMS Client in the UE. In order to additionally deliver this content over an MBMS User Service, the 5GMSd AF shall invoke xMB-C control plane procedures on the BM‑SC as specified in clauses 5.3 and 5.4 of TS 26.348 [18] and, as a result, content shall be ingested by the BM-SC from the 5GMSd AF using the xMB-U File Distribution procedures specified in clause 5.5.2 of TS 26.348 [18].

- The *MBMS Client* shall expose the service to the 5GMSd Client via the File Delivery Application Service API specified in clause 6.2 TS 26.347 [17]. (This interaction is labelled MBMS-API-C in the above figure.)

- The MBMS Client shall receive media objects from the BM‑SC according to the Download Delivery Method specified in clause 7 of TS 26.346 [16]. If an uplink is available to the MBMS Client, it should use the associated delivery procedure specified in clause 9.3 of TS 26.346 [17] for post-delivery repair of damaged media objects received from the BM-SC.

- The *Media Server* function shall be co-located with the MBMS Client per figure 5.1 of TS 26.347 [17], and shall expose the content received (and possibly repaired) by the MBMS Client to the 5GMSd Client via the HTTP client-to-application interface specified in clause 7.2 of TS 26.347 [17]. (This interaction is labelled MBMS-API-U in the above figure.)

NOTE 1: In this role, the Media Server acts as an HTTP proxy.

- In case a media object transmitted via the MBMS User Service is not received in time by the MBMS Client, or if it cannot be repaired in time for consumption by the 5GMS Client, the Media Server returns an error in response to the Media Player’s request for the media object, and the Media Player should instead attempt to retrieve the media object from the 5GMSd AS at reference point M4d, if available.

NOTE 2: In this case, it is necessary to retrieve the entire media object via M4d.

In the architecture, no new functions or interfaces are defined. However, some of the reference points need extensions to fully support the two scenarios. These extensions are detailed in the following clauses.

#### 4.2.4.2 Extensions to 5GMS reference points

##### 4.2.4.2.1 Extensions to reference point M1d

Reference point M1d is extended as follows to provision the carriage of 5GMS content via eMBMS:

- The permission to distribute content via eMBMS.

##### 4.2.4.2.2 Extensions to reference point M5d

Reference point M5d is extended as follows to support the reception of 5GMS content via eMBMS:

- The 5GMS Service Access Information is extended to include the eMBMS Service Announcement in order to bootstrap reception of the MBMS service. (This is passed by the Media Session Handler to the MBMS Client via reference point MBMS-API-C [17].)

#### 4.2.4.3 Extensions of MBMS reference points

##### 4.2.4.3.1 Extensions of User Service Announcement

The MBMS User Service Announcement is extended as follows to advertise the availability of 5GMS content delivered via eMBMS:

* The content is signaled to be 5GMS content.

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## 5.10 5GMS via eMBMS

### 5.10.1 Procedure for 5GMS content delivered exclusively via eMBMS

The call flow in Figure 5.10.1‑1 extends that defined in clause 5.3.2 to address the delivery of 5GMS media data exclusively via eMBMS.



**Figure 5.10.1-1: High-level procedure for DASH content delivery via eMBMS**

Prerequisites:

- The 5GMSd Application Provider has provisioned the 5G Media Streaming System and has set up content ingest.

- The content ingest parameters provisioned at M1d have been forwarded to the BM‑SC.

- The 5GMSd-Aware Application has received the MBMS Service Announcement from the 5GMS Application Provider.

Steps:

1: The 5GMSd-Aware Application triggers the Service Announcement procedure and the Service and Content Discovery procedure at reference point M8 for 5GMS. The 5GMS AF informs the BM-SC on the availability of 5GMS content.

2: The BM‑SC ingests content from the 5GMS AS, either through pull mode or through push mode.

3: The BM‑SC pushes content and broadcasts the Service Announcement.

4: A media content item is selected.

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

6: When the 5GMS-Aware Application has received only a reference to the Service Access Information (see step 1), the Media Session Handler interacts with the 5GMSd AF to acquire the whole Service Access Information.

7–12: The Media Session Handler acts as a MBMS-aware application and initiates the service acquisition. For details, see TS 26.347 [15]. This establishes transport session for MPD and Content.

13: The Media SessionHandler provides the MPD URL to the 5GMSd-Aware Application in order to indicate what would be the URL of the MPD

14: In parallel, the Media Player is invoked to start media access and playback.

15: The Media Player retrieves the media entry point resource (an MPD) from the proxy Media Server.

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

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

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

19: The Media Player configures the media playback pipeline.

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

21: The Media Player retrieves media segments from the proxy Media Server according to the MPD and forwards them to the appropriate media rendering pipeline.

22: Previous steps are repeated according to the MPD information.

### 5.10.2 Procedure for hybrid 5GMS content delivery via 5G System and eMBMS

Editor’s Note: To be determined.

### 5.10.3 5GMS Consumption Reporting procedure for eMBMS

Editor’s Note: To be determined.

### 5.10.4 5GMS Metrics Reporting procedure for eMBMS

Editor’s Note: To be determined.

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Annex C: 5GMS via eMBMS

# C.1 Deployment Scenarios

For 5GMS via eMBMS as introduced in clause 4.2.4 and 5.10, different deployment collaboration scenarios of the architecture as provided in clause 4.2.4 may be considered. For example:

- A content provider operates a 5GMS head-end including an 5GMS AF and a 5GMS AS, and distributes the content via eMBMS as well as via the 5GMS System. The eMBMS distribution may, for example, be a Receive-only Mode (ROM) service.

- A mobile network operator operates a 5GMS head-end including an 5GMS AF and a 5GSM AS and receives content from a 5GMSd Application Provider. The content is distributed via the eMBMS system to devices that support eMBMS, and via 5G Media Streaming otherwise.

Detailed collaboration model examples are provided in clause C.2.

Two alternative deployment options are possible:

1. 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).

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

2. Be addressed with a single FQDN. For example, the MNO-operated 5GMSd AS is mostly transparent and acts as a proxy/cache.

This case addresses the scenario in which the service is exclusively provided through MBMS, and there is no 5GMS-based unicast data delivery.

# C.2 Collaboration Models

## C.2.1 Standalone 5GMS via eMBMS

## C.2.2 Hybrid 5GMS via eMBMS

## C.2.3 Broadcast-on-demand