**SA4-e (AH) MBS SWG post 116-e (2021-12-02 - Online) S4aI211256r02**

**2nd December 2021 revision of S4-211666**

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| *CR-Form-v12.0* |
| **DRAFT CHANGE REQUEST** |
|  |
|  | **26**.**501** | **CR** | draft | **rev** | **1** | **Current version:** | **16.9.0** |  |
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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** |
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| ***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, 4.2.4 (new), 5.10 (new), Annex C (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:*** | This version is a revision of S4-211666 as agreed during SA4#116-e. In order to track the updates, all revisions in S4-211666 are accepted. |

**===== 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 23.548: "5G System Enhancements for Edge Computing; Stage 2".

[16] 3GPP TS 23.558: "Architecture for enabling Edge Applications".

[17] 3GPP TS 28.538: "Management and orchestration; Edge Computing Management".

[18] 3GPP TS 23.246: "Multimedia Broadcast/Multicast Service (MBMS); Architecture and functional description".

[19] 3GPP TS 26.346: "Multimedia Broadcast/Multicast Service (MBMS); Protocols and codecs".

[20] 3GPP TS 26.347: "Multimedia Broadcast/Multicast Service (MBMS); Application Programming Interface and URL".

[21] 3GPP TS 26.348: "Northbound Application Programming Interface (API) for Multimedia Broadcast/Multicast Service (MBMS) at the xMB reference point".

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## 4.5 5G Downlink Media Streaming via eMBMS

### 4.5.1 Architecture for 5G Downlink Media Streaming over eMBMS

Figure 4.5.1-1 below depicts the architecture for downlink 5G Media Streaming via eMBMS.



Figure 4.5.1-1: 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 [18], TS 26.346 [19], TS 26.347 [20] and TS 26.348 [21].

In this case:

- The 5GMSd AF shall configure the delivery of 5GMSd content to an MBMS Client in the UE by provisioning an MBMS User Services session in the BM‑SC. 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 [21] 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 [21].

- The *MBMS Client* is controlled by the 5GMSd Client via the Media Streaming Service API specified in clause 6.3 of TS 26.347 [20] or via the File Delivery Application Service API specified in clause 6.2 of TS 26.347 [20]. (This interaction is labelled MBMS-API-C in the above figure.)

- The MBMS Client receives media objects from the BM‑SC according to the Download Delivery Method specified in clause 7 of TS 26.346 [19]. If an uplink is available to the MBMS Client and if associated delivery procedures as specified in clause 9.3 of TS 26.346 [20] are activated, it should use the associated delivery procedures to recover damaged media objects received from the BM-SC.

- The *Media Server* function interfaces with the MBMS Client per figure 5.1 of TS 26.347 [20], 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 [20]. (This interaction is labelled MBMS-API-U in the above figure.)

- 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 may instead attempt to retrieve the media object from the 5GMSd AS at reference point M4d, if available.

NOTE: 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 support different scenarios for 5GMS via eMBMS delivery. Necessary extensions to support these scenarios are documented in the following clauses. Procedures for 5GMS via eMBMS are defined in clause 5.10.

### 4.5.2 Extensions to 5GMS reference points

#### 4.5.2.1 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 5GMS content via eMBMS.

#### 4.5.2.2 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 relevant information of the eMBMS Service Announcement in order to bootstrap reception of the MBMS service, typically via a service identifier (i.e., the **serviceId** attribute of the bundleDescription.userServiceDescription element of the USD – see TS 26.346 [19]). This is passed by the Media Session Handler to the MBMS Client via reference point MBMS-API-C [17].

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### 4.5.3 Extensions of MBMS reference points and interfaces

#### 4.5.3.1 Extensions of User Service Announcement

The MBMS User Service Announcement is extended as follows (see also clause X of TS 26.346) 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 General

This clause defines procedures for different use cases and scenarios when 5GMS is using eMBMS for delivery as introduced in clause 4.5. Different scenarios are introduced.

### 5.10.2 Procedures for 5GMS content delivered exclusively via eMBMS

In this case, 5GMS media data is exclusively delivered via eMBMS, i.e. media content is not using M4d, but only MBMS User Services. 5GMS acts as an MBMS-aware application.

The call flow in Figure 5.10.2.1‑1 extends the call flow defined in clause 5.3.2 to address the delivery of 5GMS media data exclusively via eMBMS. The extensions are indicated in bold.



**Figure 5.10.2-1: High-level procedure for DASH content delivery via eMBMS**

Prerequisites (step 0):

- The 5GMSd Application Provider has provisioned the 5G Media Streaming System, including content ingest **and the permission to distribute 5GMS content via eMBMS**.

- **The 5GMS AF has informed the BM-SC about the availability of 5GMS content** by provisioning an MBMS service **and has obtained relevant information from the eMBMS Service Announcement (such as the MBMS service identifier).**

- The BM‑SC is ingesting content **from the 5GMS AS**, using either pull mode or push mode.

- The BM‑SC has broadcast the MBMS Service Announcement, **including an indication that the content is 5GMS content**.

Steps:

1: The 5GMSd-Aware Application triggers the Service Announcement procedure and the 5GMS Service and Content Discovery procedure at reference point M8.

2: A media content item is selected.

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

4: If 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. **This includes relevant information from the eMBMS Service Announcement (such as the MBMS service identifier) in order to bootstrap reception of the MBMS service.**

**5–11: The Media Session Handler acts as an MBMS-Aware Application and initiates service acquisition. For details, see TS 26.347 [18]. This establishes a transport session for the MPD and the Content.**

NOTE: The MPD and Initialization Segment(s) are forwarded by the MBMS Client to the Media Server to enable their subsequent delivery to the Media Player upon request.

12: The Media SessionHandler provides the MPD URL to the Media Player either directly or through the 5GMSd-Aware Application.

13: The Media Player is invoked to start media access and playback.

14: The Media Player retrieves the Media Player Entry resource (an MPD) from the proxy Media Server.

15: 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). When DRM is used (see step 17) the MPD should also contain sufficient information to initialize the DRM client.

16: 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.

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

18: The Media Player configures the media playback pipeline.

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

**20–25: Content is delivered using DASH-over-MBMS. Session Announcemnent updates are provided to the MBMS Client as necessary. MPD updates and Segments are pushed to the media server. The Media Player retrieves media segments from the proxy Media Server according to the MPD and forwards them to the appropriate media rendering pipeline.**

### 5.10.3 5GMS Consumption Reporting procedures for eMBMS

Editor’s Note: To be determined.

### 5.10.4 5GMS Metrics Reporting procedures for eMBMS

Editor’s Note: To be determined.

### 5.10.5 Procedures for 5GMS content delivery via 5G System and eMBMS

Editor’s Note: To be determined.

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Annex C (informative):
Collaboration Models for 5GMS via eMBMS

# C.1 Introduction

For 5GMS via eMBMS as introduced in clauses 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 (i.e. a 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 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.

Editor’s Note: Detailed collaboration and deployment model examples to be provided for:
Broadcast-only 5GMS via eMBMS.
Hybrid 5GMS via eMBMS.
Broadcast-on-demand.