**Agenda item:** 9.8

**Source:** Qualcomm Incorporated

**Title:** [5MBUSA] 5GMS via eMBMS

**Document for** Discussion andAgreement

# Introduction

This document addresses the following aspects identified in S4-210975 aspects:

2. Define 5G Media Streaming services delivered via eMBMS, including hybrid unicast/broadcast services.

This relates to the objective documented in clause 4.

3. Extend the 5G Media Streaming architecture by providing a general description and architecture of:

c. 5GMS via eMBMS.

This document addresses concrete steps for Option A as introduced in TR 26.802, clause 5.8.2.2.

# Some Conclusions from TR 26.802

5.8.2.2 Option A: 5GMS uses MBMS User Service



**Figure 5.8.2-1 Hybrid Services of 5GMS with eMBMS User Service (Option A)**

In Option A, the 5GMSd Service provider acts as an eMBMS Content Provider. Figure 5.8.2-1 provides an architecture for which a 5GMSd Service provider uses xMB and MBMS user services for the distribution. Either of the following cases is expected to be of interest:

- The unicast option is unavailable, and the content is distributed via eMBMS only.

- The unicast option is available, and the hybrid functionalities as defined in clause 5.7.2 are supported.

5.8.3 Conclusions

Based on the discussion, it is proposed to

1) focus on Option A as it is the simplest way to distribute 5GMS content via MBMS

2) further study option B to what extent this option is feasible based on the SA2 defined architecture

3) not pursue option C.

To support 5GMS over eMBMS, it is proposed to define the architectural enhancements, call flows and procedures for 5GMS using MBMS User Services as well as hybrid 5GMS services via MBMS User Services and unicast. Stage-3 aspects to support these functionalities include extensions on 5GMS Protocols as well as extensions in xMB, MBMS user services and MBMS-APIs.

Furthermore, it is proposed to further study to what extent "5MBS uses MBMS transport-only mode” as introduced in clause 5.8.2.2 is feasible based on the SA2 defined architecture and address potential normative work at a later stage.

5.8.4 Recommended Next Steps

Based on the considerations in clause 5.8.2, the following aspects deserve normative documentation.

For Option A:

1. Architecture for 5GMS using MBMS User Services.

2. Call flows for:

a. 5GMS uses MBMS User Services without unicast support.

b. Hybrid 5GMS services using MBMS User Services and unicast.

3. M1d extensions to provision MBMS User Service delivery.

4. xMB extensions to identify content as 5GMSd Service.

5. M5d extensions provide the Service Access Information for MBMS.

6. 5GMSd extensions to support the MBMS-APIs.

7. Support for hybrid cases in combination with 7.3.4.

# Architecture for 5GMS using MBMS User Services

The architecture in Figure X below represents a harmonized architecture for 5G Media Streaming via eMBMS.



Figure X Harmonized architecture for 5G Media Streaming over eMBMS

Two deployment options are provided, as indicated also in Annex A of TS 26.501.

- 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 5GMSd Application Provider).

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

The second case addresses the scenario for which the service is exclusively being provided through MBMS and no unicast for data delivery exists. The first case addresses the scenario, for which parts of the service are also available on unicast, i.e. the hybrid case.

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

# Call flow for 5GMS via eMBMS

The initial call flow addresses the delivery of 5GMS media data exclusively via eMBMS broadcast. For this, the call flow in TS 26.501, clause 5.3.2 is extended accordingly.



**Figure X: High Level Procedure for DASH content via eMBMS**

Prerequisites:

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

- The content ingest is forwarded to the BMSC using the M1d parameters.

- The 5GMSd Aware Application has received the service announcement from the 5GMS Application Provider.

Steps:

1: The 5GMSd Aware Application triggers the Service Announcement and Service and Content Discovery procedure. The Service and Content Discovery procedure only involves the App and the external Application Server. 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.

2: The BMSC receives the content from the 5GMS AS.

3: The BMSC pushes content and broadcasts the .

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. This establishes transport session for MPD and Content.

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

14: The Media Player requests the MPD.

15: The Media Player receives the MPD.

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

17: The Media Player notifies the Media Session Handler about the MPD. The notification may contain parameters from the MPD.

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

19: The Media Player configures the media playback pipeline.

20: The Media Player requests initialization information. The Media Player repeats this step for each required initialization segment.

21: The Media Player receives the initialization information.

22: The Media Player requests media segments according to the MPD.

23: The Media Player receives media segments and puts the information into the appropriate media rendering pipeline.

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

# M1d extensions to provision MBMS User Service delivery

At this stage no extensions are considered necessary.

# xMB extensions to identify content as 5GMSd Service

At this stage no extensions are considered necessary.

# M5d extensions provide the Service Access Information for MBMS

It is proposed to define an identifier for a 5GMS over eMBMS service. This information may also come over M8d.

# 5GMSd extensions to support the MBMS-APIs

At this stage no extensions are considered necessary.

However, it should be possible that the MSH initiates the MBMS client using the SA file announcement. This is included in TS 26.347 already.

# Support for hybrid cases

The hybrid case is for further study, but the principal call flow is identical. The MPD may contain references to the network-based AS.

# Proposal

It is proposed to

* agree on the principles on MBMS re-use as defined in clause 3-9.
* Document 5GMS via eMBMS based on the architecture and call flow in an Annex of TS 26.501
* Add a reference in TS 26.502 to this scenario
* Continue the work on hybrid services as needed