**3GPP TSG SA WG4 #114e *S4-210805***

**E-meeting, 19th – 28th May 2021**

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| *CR-Form-v12.0* | | | | | | | | |
| **Pseudo CHANGE REQUEST** | | | | | | | | |
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|  | **26.802** | **CR** | **<CR#>** | **rev** | **-** | **Current version:** | **1.2.8** |  |
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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:*** | [FS\_5GMS\_Multicast] 5GMS via LTE-based 5G Broadcast | | | | | | | | | |
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| ***Source to WG:*** | Qualcomm Incorporated | | | | | | | | | |
| ***Source to TSG:*** | SA4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | FS\_5GMS\_Multicast | | | | |  | ***Date:*** | | | 2021-05-11 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-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 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)* | |
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| ***Reason for change:*** | |  | | | | | | | | |
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| ***Summary of change:*** | |  | | | | | | | | |
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| ***Consequences if not approved:*** | |  | | | | | | | | |
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| ***Clauses affected:*** | |  | | | | | | | | |
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|  | | **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:*** | |  | | | | | | | | |
| ***56*** | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

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

## 5.8 Key Issue #7: 5GMS via LTE-based 5G Broadcast

### 5.8.1 Description

This key issue proposes to study interworking of 5GMS with EPC and in particular with LTE-based 5G Broadcast and provide a solution such that the same service may be provided through EPC (unicast/broadcast) and 5GC (unicast/multicast).

In particular relevant is a 5GMS service with 5G Broadcast as defined in TS 103 720 and ROM-services as well as HPHT services, that are not supported in Rel-17 5MBS.



Figure 5.8.1-1 Interworking of 5GMS with EPC

The following aspects need to be considered

*-* The AF may be an “old” AF and only use 3GPP Release 16 xMB APIs

*-* The AF may be a “new” AF and may support both, 3GPP Rel 16 xMB APIs and new 3GPP Rel 17 M1 or MB-M1 APIs.

*-* An MCX Server can interact with multiple BM-SC and map a single MCX session to multiple MBMS bearers (with different IP Multicast Addresses and different TMGIs). We may consider also an “interworking” scenario, where an AF is aware about LTE Broadcast and 5MBS, thus, uses the old xMB and the new M1 / MB-M1 APIs simultaneously.

A similar topic referred to as Interworking is also studied TR 23.757 [7]. In particular, solution 46 addresses some aspects on this matter. However, this proposes a solution to maintain service continuity when a UE moves between an NG-RAN that supports MBS and an E-UTRAN that supports eMBMS. The solution is based on solution 10 and architecture A.2 and requires the deployment of N26. It is not considered further in the present document.

#### 5.8.2.1 Introduction

The key issue under consideration in this key topic is the ability for a network provider to deploy 5GMS-based media streaming, using LTE-based 5G Broadcast bearers as defined in ETSI TS 103 720 [27] to distribute the entire service or parts of the service. The combination of the two technologies is expected to be done to support use cases similarly as documented in clause 5.7.2.3 on the Hybrid 5MBS/5GMS service.

The combination of 5GMSd-based distribution with 5MBS is not considered in this key issue, because it relates to the hybrid service in clause 5.7. The main identified issue is the combination of 5GMSd unicast and LTE-based 5G Broadcast.

The core issues under discussion are different architecture options.

#### 5.8.2.2 Option A: 5GMS uses MBMS User Service

In Option A, the 5GMSd Service provider acts as an MBMS 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 MBMS only.

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



Figure 5.8.2-1 Hybrid Services of 5GMS with LTE-based 5G Broadcast User Service (Option A)

#### 5.8.2.2 Option B: 5MBS uses MBMS Bearer Service

In Option B, the 5G MBS Service provider acts as an MBMS Bearer Provider. Figure 5.8.2-2 provides an architecture for which a 5G MBS Service provider includes the relevant BM‑SC functionalities into MBSTF and MBSF for MBMS distribution. Again, both use cases are of interest:

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

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

Note that when there are eMBMS-only clients in the deployment, it may be needed that the content is delivered twice, or the MBSTF provides a backward compatible delivery method.



Figure 5.8.2-2 Hybrid Services of 5GMS with LTE-based 5G Broadcast Bearer Service (Option B)

#### 5.8.2.3 Option C: 5GC integration of MBMS

In a third option (Option C), support of physical layer distribution over enTV is supported in 5GC. This option is not considered as it would have impacts on 5GC outside of the control of SA4.

#### 5.8.2.4 Comparison of options

Table 5.8.2-1 provides an overview of benefits and drawbacks.

Table 6.3.2-1: Impacted Reference Points for different scenarios

|  |  |  |
| --- | --- | --- |
| Options | Benefits | Drawbacks |
| Option A: 5GMS uses MBMS User Service | This has no impact on the 5MBS System; only 5GMS needs to be updated to locate the bearer.  It is quite likely simpler that the content is send only once, targeting eMBMS-only devices and 5MBS devices. | Someone deploying 5G Broadcast cannot make use of the newly defined MBSF and MBSTF functionalitities. |
| Option B: 5MBS uses MBMS Bearer Service | It is expected that the MBSTF will provide most of the delivery functions that are anyway needed from the BM‑SC. Based on this, adding the relevant MBMS Bearer service to the MBSTF should be trivial.  The delivery functions can re-used and harmonized in a single specification.  The benefits of extensions to the new interfaces and protocols defined in 5MBS are also available to the MBMS Bearer service. | The MBSTF needs to replicate the delivery functions provided for MBMS.  When there are eMBMS-only clients in the deployment, it may be needed that the content is delivered twice, or the MBSTF provides a backward compatible delivery method. |
| Option C: 5MBS uses M1 interfaces | The equipment needed to support both 5G Broadcast enTV and and 5MBS is minimized as 5MBS includes the MBMS GW functionality. | MBMS GW functionality is simple, so no benefit for this. |

Based on the discussion, it is proposed to enable both Option A and Option B, but not Option C.

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

6.2.4 5GMS via LTE-based 5G Broadcast

In order to address the 5GMS via LTE-based 5G Broadcast use case documented in key issue #7, clause 5.8, the following aspects deserve standardization:

For Option A (5GMS uses MBMS User Services):

1. For stand-alone service without unicast:

a. M1d extensions to provision for MBMS User service delivery.

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

c. M5d extensions provide the service signaling for MBMS.

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

2. In addition, for a service that also leverages the use of 5GMSd unicast, the equivalent scenarios introduced in clause 6.2.3 may be provided for:

a. Fast Start-up,

b. Session continuity.

c. Enhanced service quality.

d. Component replacement.

e. Time-shifted viewing.

f. Content replacement.

g. Reporting.

h. Interactive service.

For Option B (5MBS uses MBMS Bearer Service):

3. For stand-alone service without unicast:

a. Nmb2 extensions to provision for MBMS Bearer service delivery.

b. M5d extensions provide the service signaling for MBMS-based 5MBS.

c. Extensions to deliver 5GMS content through support MBMS Bearer Service using the MBSTF.

4. In addition, for a service that also leverages the use of 5GMSd unicast, the equivalent scenarios introduced in clause 6.2.3 may be provided for:

a. Reporting.

b. Unicast recovery.

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

7.3.6 5GMS via LTE-based 5G Broadcast

Based on the considerations in clause 5.8.2 and clause 6.2.4, 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.

For Option B

8. Architecture for 5MBS using MBMS Bearer Service.

9. Call flows for:

a. 5MBS uses MBMS Bearer Service without unicast.

b. Hybrid 5MBS services using MBMS bearer services and unicast.

10. Nmb2 extensions to provision MBMS Bearer service delivery in the MBSTF.

11. M5d extensions provide the service signaling for MBMS-based 5MBS.

12. Extensions to deliver 5GMS content through support MBMS Bearer Service using the MBSTF.

13. Support for reporting.

14. Support for unicast recovery.

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# 8 Conclusions and Next Steps

As a result of the content of this technical report, the following next steps are proposed.

* Architectural Extensions
  + Provide extensions to 5GMS Architecture in order to support delivering 5GMS-based services and content using MBMS User Services, in particular LTE-based 5G Broadcast as defined in ETSI TS 103 720, including hybrid services.
  + Provide functionalities in 5MBS user service architecture in order to support delivering 5GMS-based services and content using MBMS Bearer Services, in particular LTE-based 5G Broadcast as defined in ETSI TS 103 720, including hybrid services.
  + Provide extensions to MBMS Architecture in order to support delivering 5GMS-based services and content using MBMS User Services, in particular LTE-based 5G Broadcast as defined in ETSI TS 103 720, including hybrid services.
* Protocol Extensions
  + Provide extensions to 5GMS protocols in order to support delivering 5GMS-based services and content using MBMS User Services, in particular LTE-based 5G Broadcast as defined in ETSI TS 103 720, including hybrid services.
  + Provide functionalities in 5MBS user service protocols in order to support delivering 5GMS-based services and content using MBMS Bearer Services, in particular LTE-based 5G Broadcast as defined in ETSI TS 103 720, including hybrid services.
  + Provide extensions to MBMS protocols (xMB, MBMS-APIs) in order to support delivering 5GMS-based services and content using MBMS User Services, in particular LTE-based 5G Broadcast as defined in ETSI TS 103 720, including hybrid services.