**3GPP TSG SA WG4#114-e** ***S4-210779***

**E-meeting, 19th-28th May, 2021**

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| *CR-Form-v12.0* | | | | | | | | |
| **PSEUDO CHANGE REQUEST** | | | | | | | | |
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|  | **TR 26.802** | **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 |  | Radio Access Network |  | Core Network |  |

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| ***Title:*** | pCR to TR26.802 on conclusions | | | | | | | | | |
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| ***Source to WG:*** | TELUS | | | | | | | | | |
| ***Source to TSG:*** | S4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | FS\_5GMS\_Multicast | | | | |  | ***Date:*** | | | 2021-05-12 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **D** |  | | | | | ***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)*. | | | | | | | |  | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Added potential standardization areas and solutions | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | |  | | | | | | | | |
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| ***Consequences if not approved:*** | |  | | | | | | | | |
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| ***Clauses affected:*** | | Several clauses | | | | | | | | |
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|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | |  | | |
| ***affected:*** | |  | **X** | Test specifications | | | |  | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | |  | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | | Changes against baseline document TR 26.802 v1.2.8 | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

FIRST CHANGE

### 4.4.3 5G Multicast–Broadcast Services (5MBS) system architecture

Figure 4.4.3‑1 below illustrates the 5G Multicast–Broadcast Services (5MBS) system architecture in reference point representation. It is logically identical to Figure 5.1‑2 in TS 23.247 [26].

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Figure 4.4.3-1: 5G Multicast–Broadcast Services system architecture in reference point representation

### 4.4.4 Baseline Network Reference Architectures

#### 4.4.4.1 General

This clause presents a variant of the network reference architecture in clause 5 of TS 23.247 [26] with the following changes:

- Reference point “xMB” only refers to an interface that is provided by the BM-SC. For the 5MBS media delivery functions, the MBSTF exposes an interface which is xMB-U based.

- The MBSF is integrated into a 5GMS AF function that may expose an internal API resembling xMB-C. Support for standalone MBSF is for study.

- A standalone MBSF may be needed for different interworking scenarios. Interworking with legacy systems is for further study.

Legend for Figure 4.4.4.2-1 and Figure 4.4.4.3-1:

- Blue boxes: control plane functions as shown in TS 23.247 Figure 5.1-2.

- Orange boxes: user plane functions as shown in TS 23.247 Figure 5.1-2. .

- White boxes: 5GMS functions.

- Blue lines: control plane interfaces.

- Red lines: user plane interfaces.

- Black labeled interfaces: existing reference points from Release 16.

- Coloured labeled interfaces: newly coined reference points for Release 17.

#### 4.4.4.2 5GMSA functions in the Trusted DN

The following diagram illustrates a network reference architecture with all 5GMS and 5MBS functions within the Trusted DN. A 5GMS Application Provider (typically) in an External DN configures the 5GMS features via a Release 17 version of M1d interface. Two different models are considered:

1: The usage of 5MBS for media distribution is completely hidden from the 5GMS Application Provider. The 5GMS System selects usage of 5MBS based on internal criteria.

2: By means of 5GMS provisioning procedures at (extended) M1d, the 5GMS Application Provider explicitly controls the potential usage of 5MBS in certain areas and for certain content. For example, some content might not be authorized for 5MBS distribution by content rights owners. Or, some content might only be authorized for 5MBS distribution.

C:\Users\t841804\AppData\Local\Microsoft\Windows\INetCache\Content.Word\5MBS reference architecture - Converged architecture mapping to 5GMS 2021-05-12.emf

Figure 4.4.4.2-1: 5MBS architecture combined with 5GMS hosted in Trusted DN

#### 4.4.4.3 5GMSA functions in an External DN

The following diagram illustrates a network reference architecture with all 5GMS within an external DN. Only the MBSTF resides inside a trusted DN. A 5GMS Application Provider (typically) in an external DN configures the 5GMS features via a Release 17 version of M1d interface.

C:\Users\t841804\AppData\Local\Microsoft\Windows\INetCache\Content.Word\5MBS reference architecture - Converged architecture mapping to 5GMS (external) 2021-05-12.emf

Figure 4.4.4.3-1: 5MBS architecture combined with 5GMS hosted in External DN

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#### 4.4.5.4 5GMS client architecture using 5MBS (option B)

(SNIPPED)

In practical deployments that combine 5G Media Streaming with 5MBS, the MBSF is likely to be co-located with the 5GMS AF, as described in clause 4.4.1 of the present document. In addition, the 5MBS AS is likely to be co-located with the 5GMS AS in such deployments because the two functions share a high degree of commonality. Figure 4.4.5.4‑2 below illustrates this likely deployment architecture.

C:\Users\t841804\AppData\Local\Microsoft\Windows\INetCache\Content.Word\FS_5GMS_Multicast - Client architecture - Combined 5GMS and 5MBS (alternative v4) 2021-05-12.emf

Figure 4.4.5.4-2: Combined 5GMS and MBS client architecture (option B) depicting likely co-location

NEXT CHANGE

## 6.2 Potential Standardization Areas

### 6.2.1 Introduction

Initially, the following areas are identified as potential standardization areas:

* Create Delivery Methods in the MBSTF to support 5MBS User Service to use 5MBS capabilities.
* Define Service aspects in MBSF, such as User Service Announcement.
* Using 5MBS together with 5G Media Streaming Architecture is one scenario.
* Define Nmb6 (based on xMB-C) and Nmb4 (based on xMB-U). It is assumed that MB2 interface will be supported in Release 17 “as is”.
* Define the realization of Nmb2 (between MBSF and MBSTF), which configures and controls the delivery functions (like object delivery).
* Expect to have a new spec TS 26.502 to document these potential standardization areas.

### 6.2.2 5MBS User Service Architecture

Figure 6.2-1 provides a view of the network architecture for 5MBS User Service delivery and control. In this figure, two potential standardization areas are identified:

1. How AF and MBSF interact to support MBS session operations and transport (i.e. xMB-C and MB2-C reference points).

2. How to provide MBSTF functionality related to MBS data handling (e.g. encoding) via xMB-U and MB2-U interfaces. Based on the definition in TS 23.247, MBSTF performs generic packet transport functionalities available to any IP multicast enabled application such as framing, multiple flows, packet FEC (encoding). It also performs multicast/broadcast delivery of input files as objects or object flows. If needed, MBSTF provides a media anchor for MBS data traffic and sourcing of IP multicast.



Figure 6.2-1: Network Architecture for 5MBS User Service Delivery and Contro

NEXT CHANGE

# 7 Potential Solutions

## 7.1 General

This clause provides potential solutions for the standardization areas identified in clause 6.

## 7.2 Support of multicast ABR in 5G Media Streaming Architecture

(SNIPPED)

## 7.3 Multicast-Broadcast User Service

### 7.3.1 Introduction

An “MBMS user service”-like support is expected to be provided by the MBSF and MBSTF. 5MBS User Services enable applications. It presents a complete service offering to an end-user, via a set of APIs that allows the 5MBS Client to activate or deactivate reception of the service.

The 5MBS User Service architecture is independendent of 5G Media Streaming (5GMS) and may be used without 5GMS. There are scenarios where 5GMS is the northbound application function, as depicted in clause 5.4 where four different deployment models are presented. In another example, 5G Multicast ABR media streaming service could be a User Service where the 5MBS User Services allow streaming of DASH content as defined in TS 26.501, and it also includes the use of a MBS session to deliver the DASH segments in multicast. When delivering content to a 5MBS Client, the MBSTF uses one or more 5MBS Delivery Methods.

Figure 7.3.1-1 depicts a potential solution for functional entities in MBSF and MBSTF to support 5G Multicast-Broadcast User Service.



Figure 7.3.1-1: 5GS multicast-broadcast user service functional entities

### 7.3.2 MBSF

The following functions in the MBSF to support 5MBS will be defined in 3GPP TS 23.247 [26]:

- Interacting with MB-SMF for MBS session operations, determination of N6mb transport parameters, and session transport (via interface Nmb1).

- Selection of serving MB-SMF for an MBS Session (via interface Nmb1).

NOTE: The equivalent reference point of Nmb1 in MBMS control plane is SGmb.

- Configuration (via interface Nmb2) of the sender IP multicast address to use for the MBS session in cases where the IP multicast stream is originated by the MBSTF.

The following MBSF functionality and procedures related to service and MBS data handling to support 5MBS User Service are studied in the present document:

- Interacting with the MBSTF (if needed) for 5MBS Delivery Method control (via Nmb2).

- Interacting with the AF (optionally via NEF) (via Nmb6/xMB-C).

Editor’s Note: It is assumed that MB2-C interface will be supported in Release 17 “as is”, as specified in 3GPP TS 29.468 [18] and RFC 6733 [20].

- Interacting with the PCF (via Nmb7) to relay or initiate a request for different PCF treatment.

- Interacting with the UE (via MBS-5).

NOTE: The MBS-5 interface might be a abstract interface, i.e. using an undefined/external transport.

- The User Service Discovery/Announcement provides session access information, which is necessary to initiate the reception of a 5MBS User Service. The session access information may contain information for presentation to the end-user, as well as application parameters used in generating service content to the 5MBS Client.

### 7.3.3 MBSTF

In MBSTF, the use of reference point Nmb5 to provide IP multicast traffic delivery to the MB-UPF will be defined in 3GPP TS 23.247 [26].

NOTE: The equivalent reference point of Nmb5 in MBMS is SGi-mb.

The following MBSTF functionality and Delivery Methods related to MBS data handling, to support 5MBS User Services, will be studied in the present document.

- Interacting with the AS (via interface Nmb4/xMB-U).

- Interacting with the UE (via MBS-4-MC).

A set of 5MBS Delivery Methods are provided by the MBSTF. These provide functionality such as security and key distribution, reliability control (by means of FEC techniques) and associated delivery procedures. The following Delivery Methods will be studied in the present document:

***- Object delivery method:*** Functionally, this is equivalent to the “Download Delivery Method” in TS 26.346 [16] and also supports the delivery of media segments (as special objects).

Figure 5.3.1.1-1 illustrates a simplified user plane model of FLUTE as an example of a possible MBSTF object delivery method.

Editor’s Note: The protocol to support the object delivery function is for future study.

***- Transparent delivery method:*** This supports the IP streaming use cases, for which UDP payloads (also referred to as Application Data Units) are distributed as part of UDP or IP flows carried to the UE over an MBS session. Examples of higher layer protocols are RTP, packetized MPEG-2 TS or other UDP-based streams.

***- Group Communication delivery method:*** This delivers a multicast UDP/IP packet flow to the UE.

Editor’s Note: The potential merger of Transparent delivery method and Group Communication delivery method is for future study.

The above Delivery Methods may use either a multicast or broadcast session to deliver content to a receiving application, and may also make use of a set of 5MBS associated delivery procedures.

***MBS session*** refers to a multicast session or a broadcast session, as defined in TS 23.247 [26].

- In a ***Multicast MBS session***, an MBS session delivers the multicast communication service. A Multicast MBS session is characterised by the content to send, by the list of UEs that may receive the service and, optionally, by a multicast area in which to distribute it

- In a ***Broadcast MBS session***, an MBS session delivers the broadcast communication service. A broadcast MBS session is characterised by the content to send and the geographical area for content distribution.

### 7.3.4 5MBS together with 5G Media Streaming Architecture

Figure 7.3.4-1 depicts a deployment of 5G Media Downlink Streaming delivery over multicast. The 5GMSd Application Provider is a combined external application entity and content-specific media functionality (e.g. media creation, encoding and formatting) that uses the 5GMS System to distribute media to a 5GMSd-Aware Application.



Figure 7.3.4-1: 5G multicast media streaming User Service functional entities

The 5GMSd AF provides 5G Media Downlink Streaming provisioning, and various control functions to the Media Session Handler in the 5GMS Client located in the UE. It may relay or initate a request for different PCF treatment.

In the deployment architecture as shown by Figure 7.3.4-1, the 5GMSdAF and MBSF are fully separated logical functions. Alternatively, as depicted in Figure 5.4.2-1, the MBSF could be integrated within the 5GMSd AF. In such a deployment, the embedded MBSF still uses the Nmb2 to configure and control the multicast delivery functionality of the MBSTF.

Detailed deployment options in the UE are described in clause 4.4.2 of the present document.

Editor’s Note: How to use the 5GS broadcast-multicast User Service to address key issues 1 and 4 is for future study.

NEXT CHANGE

# 8 Conclusions and Next Steps

## 8.1 General

The following conclusions are reached as baseline for normative work:

- Define the configuration of Delivery Methods in the MBSTF to realise 5MBS User Services in the MBSF using available 5MBS capabilities.

- Define Service aspects in the MBSF, such as User Service Announcement.

- Using 5MBS together with 5G Media Streaming Architecture is one scenario that needs to be supported.

- Define Nmb6 (based on xMB-C) and Nmb4 (based on xMB-U).

NOTE: It is assumed that MB2 interface will be supported in Release 17 “as is”.

- Define the realization of Nmb2 (between MBSF and MBSTF), which configures and controls the Delivery Methods (such as object delivery).

- Expect to have several new specifications to document these potential standardization areas:-

- TS 26.502 defining the 5G MBS User Service protocol, Delivery Methods and codec aspects. The objective of the proposed work item is the definition of a set of transport/application protocols to enable the deployment of 5MBS User Services. The present document takes into consideration the need to maximize the reuse of components of already specified MBMS.-

- TS 26.5xx defining the 5MBS Client API.-

- Extend TS 26.501 to include 5G Multicast ABR general description and architecture.-

Table 8.1-1: Summary of Key Issues, Conclusions and Next Steps

|  |  |
| --- | --- |
| Key Issues | Conclusions and Next Steps |
| Key Issue#1: How to support multicast ABR in 5G Media Streaming Architectrue | Mapping relevant MABR logical functions into 5G Multicast/Broadcast Service architecture.  Standardize how to use Delivery Methods, and collaboration models to support MABR. |
| Key Issue#2: How to design Nmb2 interface | Nx2 provides interaction between MBSF and MBSTF |
| Key Issue#3: Collaboration and deployment scenarios | Collaboration B2 deployed without 5GMS functions as baseline reference architecture for normative work |
| Key Issue #4: Reuse of MBMS service layer | In the normative work, define detailed service layer in MBSF and MBSTF. |
| Key Issue #5: Client architecture options | Extended 5MBS architecture independent of 5GMS. |
| Key Issue #6: Hybrid services | The key issue is not addressed within the Rel-17 timeframe. |
| Key Issue #7: Interworking | The key issue is not addressed within the Rel-17 timeframe. |

## 8.2 Conclusions for Key Issue #1

In Key issue #1, through the exercise of mapping the relevant MABR logical functions into 5G Multicast/Broadcast Service architecture, the following conclusions are proposed to move to normative work.

As agreed in clause 7.3.1, 5G Multicast ABR media streaming service could be a User Service where the 5MBS User Services allow streaming of DASH content as defined in TS 26.501, and it also includes the use of a MBS session to deliver the DASH segments in multicast. When delivering content to a 5MBS Client, the MBSTF uses one or more 5MBS Delivery Methods.

It is proposed to provide a general description and architecture for 5G Multicast ABR scenario in TS 26.501, with reference to the collaboration B0 mapping in clause 7.2.1.4. The 5G Multicast ABR in the extended 5GMS system includes the following normative works:

1. Provide a general description of logical functions, reference points and protocols to support 5G Multicast ABR functionality.
2. Outline procedures for configuring the 5G Multicast ABR features relevant to 5MBS system and/or (extended) 5GMS Architecture.
3. Outline procedures for discovering and establishing a Multicast ABR session, for switching dynamically between multicast transport sessions, for recovering from multicast packet loss and for reporting usage statistics and Quality of Experience metrics for the purpose of optimal service management.

## 8.3 Conclusions for Key Issue #2: how to design Nmb2 reference point

tbd

## 8.4 Conclusions for Key Issue #3

tbd

## 8.5 Conclusions for Key Issue #4

Based on the discussions in the present document, the following re-use aspects are proposed.

1. The following “user service” functionalities (as defined in TS 26.346) with proper mapping to 5G MBS architecture (as to be defined in Rel-17, TS 23.247) are proposed to be reused and extended if needed. The combination with 5G Media Streaming is one deployment scenario.

o Service Announcement and Discovery as defined in TS 26.346 based on userServiceDescription. Stage-3 aspects may be reconsidered.

o Download Delivery method, File Delivery as defined in TS 26.346, clause 7.

o DASH/HLS over MBMS (both broadcast/multicast only as well as hybrid) as defined in TS 26.346, clause 5.3.

o Transparent delivery method as defined in TS 26.346, clause 8B.

o Associated delivery procedures as defined in TS 26.346, clause 9.

2. Define the necessary extensions of relevant “MBMS Service Layer” functionalities to support 5GS and 5G MBS Sessions (as to be defined in Rel-17, TS 23.247). This pre-dominantly includes the definition or proper delivery method establishment.

## 8.6 Conclusions for Key Issue #5

It is proposed to define the User Plane and Control Plane Functionalities/APIs of “MBMS Client” and map to 5G MBS (clause 6 in TS 26.347 is control, clause 7 in TS 26.347 is user).

The various client architecture will be specified in new specification on 5MBS Client API TS 26.5xx.

## 8.7 Conclusions for Key Issue #6

The key issue is not addressed in Release 17.

## 8.8 Conclusions for Key Issue #7

As specified in clause 6.8 of TS 23.247 [26], copied here for the convenience of this study

In order to minimize the interruption of services, upon mobility from NR/5GC to E-UTRAN/EPC, the following applies:

- If the same multicast service is provided via eMBMS in target E-UTRAN, the session context for multicast service transferring is not handover to E-UTRAN during mobility from 5GS to EPS, i.e. the EPS bearer context associated with the MBS session is not transferred to EPS network. UE releases the related EPS bearer(s) and the associated MBS session context locally. After handover, the UE is connected to the target E-UTRAN, the UE starts to receive the service via eMBMS.

- If the same multicast service is not provided via eMBMS in target E-UTRAN, during handover from 5GS to EPS procedure, the 5GC shared MBS traffic delivery method is switched to Individual MBS traffic delivery over EPS. The unicast QoS flow(s) corresponding to the multicast QoS flow(s) of the MBS session are mapped to EPS bearer(s).

In order to minimize the interruption of services, upon mobility from E-UTRAN/EPC to NR/5GC, the following applies:

- Before EPS to 5GS mobility, the application may trigger the switching the service receiving from eMBMS to Individual MBS traffic delivery over EPS. The AF provides the MBS Session ID (i.e. the TMGI or multicast IP address) as part of service information to PCF to trigger EPS bearer resource allocation for the service. Based on the received MBS Session ID, the SMF+PGW-C link the established EPS bearer(s) with the indicated MBS session.

- If the UE receives the service via the Individual MBS traffic delivery over EPS, the Individual MBS traffic delivery over EPS is switched to 5GC Individual MBS traffic delivery method during handover from EPS to 5GS procedure. After handover, the SMF+PGW-C switches the 5GC Individual MBS traffic delivery method to 5GC shared MBS traffic delivery method if the target NG-RAN supports 5G MBS.

- If the UE receives the service via eMBMS in source E-UTRAN, after handover from EPS to 5GS, the UE may join the 5MBS Session directly without reporting the UE is out of eMBMS service to AF.

The other aspects of this key issue are not addressed in TS 26.502. They should be addressed in the corresponding eMBMS specification to provide interworking with 5G MBS.

END OF CHANGES