**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:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***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

# 2 References

The following documents contain provisions that, through reference in this text, constitute provisions of the present document.

[27] 3GPP TS 26.511: "5G Media Streaming (5GMS); Profiles, codecs and formats".

[28] 3GPP TS 26.512: "5G Media Streaming (5GMS); Protocols".

NEXT 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].

C:\Users\t841804\AppData\Local\Microsoft\Windows\INetCache\Content.Word\5MBS System Architecture - Reference point representation 2020-05-12.emf

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 that 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: Application servers and functions, for example, a 5GMSd AF and AS.

- 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 for 5MBS in the 5GMS architecture.

#### 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

NEXT CHANGE

#### 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

### 5.6.3 Conclusions

It is proposed to define the User Plane and Control Plane Functionalities and APIs of a 5MBS Client, as the counterpart of “MBMS Client” API in clause 6 in TS 26.347 for the control plane and clause 7 in TS 26.347 for the user plane. As significant similarities between MBMS-APIs and 5MBS-APIs are expected, an extension of TS 26.347 may be considered to also include 5MBS-APIs.

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 Announcements.
* 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 Control

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 independent 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 an 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).

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 abstract, 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 real-time delivery of media segments (as special objects) including Low-Latency CMAF delivery.

Figure 5.3.1.1-1 illustrates a simplified user plane model of FLUTE as an example of a possible MBSTF object delivery method. However, 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 Notes:The potential merger of the Transparent delivery method and Group Communication delivery method is for future study. For details also refer to clause 5.5.2.

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 initiate a request for different PCF treatments.

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.

NEXT CHANGE

# 8 Conclusions and Next Steps

## 8.1 General

Table 8.1-1 points to conclusions and next steps for each of the key issues studied in the present document.

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

|  |  |
| --- | --- |
| Key Issue | Conclusions and Next Steps clause |
| Key Issue#1: How to support multicast ABR in 5G Media Streaming Architecture | 5.2.7 |
| Key Issue#2: How to design Nmb2 interface | 5.3.3 |
| Key Issue#3: Collaboration and deployment scenarios | 5.4.6 |
| Key Issue #4: Reuse of MBMS service layer | 5.5.2 |
| Key Issue #5: Client architecture options | 5.6.3 |
| Key Issue #6: Hybrid 5GMS services | 5.7.3 |
| Key Issue #7: 5GMS via eMBMS | 5.8.3 and 5.8.4 |

## 8.2 Conclusions

Based on the conclusions for the key issues studied in the present document (as summarized in clause 8.1 above), the following consolidated conclusions are reached as an agreed baseline for potential standardization:

1. Define 5G Media Streaming services delivered via 5MBS, including hybrid services.

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

3. Define service aspects in the MBSF, such as the User Service announcement. This includes the definition of a data model for 5MBS services including a session model and its mapping to 5MBS transport.

4. Define the Delivery Methods in the MBSTF to realise 5MBS User Services in the MBSF using available 5MBS capabilities, including support for Group Communication delivery.

5. Define 5MBS associated delivery procedures, including file repair and delivery reporting.

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

7. Define reference point Nmb6 for provisioning the MBSF (based on xMB-C) and Nmb4 for ingesting content into the MBSTF (based on xMB-U).

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

8. Define the functionalities and APIs of the 5MBS Client.

9. Define procedures for discovering and establishing a Multicast ABR session, for dynamically (de)selecting multicast transport sessions, for recovering from multicast packet loss and for reporting usage statistics and Quality of Experience metrics for optimal service management.

10. Any new specification will take into consideration the need to maximize the reuse of components already specified in MBMS.

Note that the specific conclusions for each key issue as documented in Table 8.1-1 are expected to be taken into account in the detailed definition of new functionalities.

## 8.3 Recommended normative work

To document the potential standardization areas identified in clause 8.2 above, it is expected that several new specifications are produced and several existing specifications are extended.

In particular, the following normative specification work is recommended for immediate action:

1. A new architecture specification (as an example, TS 26.502) to define a 5MBS User Service architecture, including the following reference points/interfaces and entities:
2. New entities MBSF, MBSTF, 5MBS Client, and 5MBS AS
3. the northbound reference points Nmb6 and Nmb4
4. the reference point Nmb2 between the MBSF and the MBSTF
5. the interfaces between 5MBS Client and 5MBS network functions, MBS-4-UC, MBS-4-MC, and MBS-5
6. the 5MBS Client reference points MBS-6 and MBS-7

Editor’s Note: there is a dependency on SA2’s work on Rel-17 TS 23.247, which should be functionally frozen in June 2021.

This specification also includes:

1. Relevant call flows and procedures to support 5GMS over 5MBS

g. Relevant call flows and procedures to support 5GMS hybrid services

h. Relevant call flows and procedures for 5GMS independent usage of 5MBS

2. In combination with the new 5MBS User Service Architecture specification (e.g. TS 26.502) above, extend TS 26.501 by providing a general description and architecture of:

a. 5GMS via 5MBS.

b. 5GMS hybrid services.

c. 5GMS via eMBMS.

d. Multicast ABR with 5GMS and 5MBS.

The following normative work is expected subsequently:

3. A new specification (as an example TS 26.513) to define the 5MBS User Service transport/application protocols and Delivery Methods for the interfaces defined in the 5MBS User Service Architecture specification (e.g. TS 26.502) above. This specification will take into consideration the need to maximize the reuse of components of already specified MBMS.

4. Extend TS 26.347 to provide Client APIs for 5MBS User Services, as defined in the 5MBS User Service Architecture specification (e.g. TS 26.502) above.

5. Extend relevant clauses in TS 26.512 [28] to realise the procedures defined in the 5MBS User Service Architecture specification (e.g. TS 26.502) above for 5GMS via 5MBS, 5GMS hybrid services, 5GMS via eMBMS, and Multicast ABR with 5GMS and 5MBS, as needed.

6. Extend relevant clauses in TS 26.346 [16] to define protocols and codecs for 5GMS via 5MBS, 5GMS hybrid services, 5GMS via eMBMS, and Multicast ABR with 5GMS and 5MBS, as needed.

END OF CHANGES