**3GPP TSG- S4 Meeting #116e *S4-211518***

**, – 19th November 2021**

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| *CR-Form-v12.1* | | | | | | | | |
| **Pseudo CHANGE REQUEST** | | | | | | | | |
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|  |  | **CR** |  | **Rev** |  | **Current version:** |  |  |
|  | | | | | | | | |
| *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:*** | [5MBUSA] Clause 4: MBS User Service functional entity definition | | | | | | | | | |
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| ***Source to WG:*** | , BBC | | | | | | | | | |
| ***Source to TSG:*** | S4 | | | | | | | | | |
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| ***Work item code:*** | 5MBUSA | | | | |  | ***Date:*** | | |  |
|  |  | | | |  | |  | | |  |
| ***Category:*** |  |  | | | | | ***Release:*** | | |  |
|  | *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-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
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| ***Reason for change:*** | |  | | | | | | | | |
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| ***Summary of change:*** | | The intention of this document is to start introducing MBUSA functional entities, focusing on MBSTF and the reference point between MBSTF and MBSF. | | | | | | | | |
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| ***Consequences if not approved:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  |  | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  |  | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  |  | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

\*\*\*\* First Change \*\*\*\*

# 4 Reference architecture for 5G Multicast–Broadcast User Services

## 4.1 General

This clause defines a reference architecture for 5G Multicast–Broadcast User Services, including the logical functions involved and the logical reference points between them.

## 4.2 System description

Editor’s Note: Explanation of fundamental concepts in the MBS User Services architecture.

### 4.2.1 Network architecture

Editor’s Note: How this specification relates to the SA2 architecture in TS 23.247.

### 4.2.2 User Service architecture

Editor’s Note: Introduction to MBS User Services and how they are manifested in the MBSF and MBSTF.

### 4.2.3 Delivery methods

Editor’s Note: Explanation of what a delivery method is and what delivery methods are for.

### 4.2.4 Service announcement and discovery

The Service Announcement provides information needed by the MBS Client to discover and activate the reception of one or multiple MBS User Services. Service Announcement information may be delivered via MBS Sessions or via a regular PDU Session.

Editor’s Note: The concept of ancillary information need to be described and defined in the context of the Service Announcement,

Editor’s Note: Introduce the Service Announcement Channel concept.

## 4.3 Functional entities

Editor’s Note: Reference architecture for MBS User Services, including client functions.

### 4.3.1 General

The MBSF and MBSTF offer service layer functionalities for sending data via MBS Sessions. The MBSTF (see clause 4.3.3) acts as a user-plane data anchor when it sources the IP multicast traffic. The MBSF (see clause 4.3.2) offers control plane functionality while the MBSTF (clause 4.3.3) offers user plane functionality. An interface Nmb2 is introduced between the MBSF and MBSTF.

### 4.3.2 MBSF

The functionality of the MBSF is defined in clause 5.3.2.11 of TS 23.247 [5]. It receives provisioning and control commands either directly at reference point Nmb10 or at reference point Nmb5 (via the NEF). An MBSTF shall be controlled by the MBSF. The MBSF invokes MBS Session operations on the MB-SMF at reference point Nmb1.

The present document defines additional control plane functionalities of the MBSF to support MBS User Services including:

- Generating the Service Announcement for each MBS Session.

- Managing Service Announcement updates.

- Providing the Service Announcement information to the MBS Client on the UE. For this purpose, different options may be considered:

- Service Announcement using an application

- Service Announcement using unicast MBS-5

- Service Announcement using an MBS User Service Session

[- Monitoring the status of ancillary information and configuring its delivery in the same MBS Session as the content with which it is associated if ancillary information is changed and the MBSTF is used.]

Editor’s Note: Usage of QoS is FFS

### 4.3.3 MBSTF

#### 4.3.3.1 General

The functionality of the MBSTF is defined in clause 5.3.2.12 of TS 23.247 [5]. It receives User Plane data traffic at reference point Nmb8 and sends MBS data packets to the MB‑UPF via reference point Nmb9.

NOTE: The MBSTF may not be present in all deployments of the MBS System.

The present document defines additional the User Plane functionalities of the MBSTF to support MBS User Services as follows:

- Multicast delivery of ingested objects or object streams to the MBS Client for the Object Distribution Method (see clause 6.1).

- Multicast delivery of ingested packet streams to the MBS Client for the [Packet|PDU] Distribution Method (see clause 6.2).

- Multiplexing of ancillary information into the MBS Session.

- Carousel delivery control for the Object Distribution Method.

- Sending notification events to the MBSF, e.g. data ingest failure, session terminated, delivery started.

#### 4.3.3.2 MBSTF subfunctions to support Object Distribution Method

The MBSTF subfunctions supporting the Object Distribution Method are depicted in figure 4.3.3.2-1 below.



Figure 4.3.3.2-1: MBSTF architecture overview for Object Distribution Method

The *Object ingest* subfunction supports:

- Pull-based ingest at reference point Nmb8: The Object ingest subfunction in this case fetches one or more objects from an AF/AS using HTTPS.

- Push-based ingest at reference point Nmb8: The Object ingest subfunction receives one or more objects from an AF/AS using HTTPS.

- At least the following object types are supported

- Single objects

- object carousels for which objects are updated regularly on the origin,

- object bundles that need all be available at the source for consuming one object

- object streams, objects get available over time

- Object properties or object stream properties are provided to the MBSF in order to properly dimension the object delivery function as well as the QoS.

The *Object segmentation subfunction* supports the partitioning of an object into payload units suitable for MBS transmission.

The optional *Application Layer FEC* subfunction to support object recovery even if parts of the object are lost.

The *Packetisation* subfunction places the payload units (and, optionally, the FEC data) into Nmb9 transmission packets according to clause X.

The *Packet scheduling* subfunction schedules the outgoing packet stream according to target bit rate configuration.

The control subfunction offers support for MBSTF service configuration and service notifications at reference point Nmb2.

#### 4.3.3.3 MBSTF subfunctions to support [Packet|PDU] Distribution Method

The MBSTF subfunctions supporting the [Packet|PDU] Distribution Method are depicted in figure 4.3.3.3-1 below.



Figure 4.3.3.3-1: MBSTF architecture overview for Packet Distribution Method

The *Packet ingest* subfunction supports the reception of a packet stream at reference point Nmb2 from authorized sources. Packet stream properties are provided to the MBSF in order to properly dimension the packet delivery function

The optional *Application Layer FEC* subfunction to support packet recovery even if packets may be lost.

The *Packetisation* subfunction places the ingested packets (and, optionally, the FEC data) into Nmb9 transmission packets. Depending on the transmission mode, ingested packets may be reformatted suitable for MBS transmission.

The *Packet scheduling* subfunction schedules the outgoing data stream according to target bit rate configuration.

The control subfunction offers support for MBSTF service configuration and service notifications at reference point Nmb2.

### 4.3.4 MBS AS

The MBS AS performs the following functions to support MBS User Services:

- Providing a byte-range file repair service for the Object Distribution Method.

### 4.3.5 MBS Client

The MBS Client is part of the UE. The functionality of the UE is defined in clause 5.3.2.8 of TS 23.247 [5].

In this architecture, the MBS client is further divided into

- MBSF Client: MBS client component that logically communicates with the MBSF on MBS User Service Control aspects.

- MBSTF Client: MBS client component that logically communicates with the MBSTF or MBS AS in order to provide an MBS Application Data Session to the MBS-Aware application.

The MBS Client performs the following functions to support MBS User Services:

- Reception of IP multicast data from either a Multicast MBS Session or a Broadcast MBS Session.

- Exposure of MBS Application Data Sessions towards a MBS-aware Application.

- Using AL-FEC to recover packets or objects if this optional feature is provisioned for the MBS Session,

- Unicast recovery of the application payload data carried in multicast/broadcast packets that are not successfully received via MBS-4, if unicast repair is provisioned for the MBS Session.

Editor’s Note: Handling roaming is FFS.

Editor’s Note: The MBMS Reception Reporting Service is FFS. In principle, the Reception Reporting is used by the Network Operators to analyse the packet loss rate (Block Error Rates - BLER), and the main target is to adjust the FEC redundancy level to leverage the FEC redundancy level and radio frequency usage efficiency. Reception reporting could be realised by instantiating the EVEX Data Collection and Reporting architecture in the present document.

\*\*\*\* Last Change \*\*\*\*