**SA WG2 Meeting #S2-143E S2-210xxxx**

**February 24 – March 9 2021, Elbonia *(was S2-2100449)***

**Source: Qualcomm**

**Title: 5MBS interworking with eMBMS**

**Document for: Approval**

**Agenda Item: 8.9**

**Work Item / Release: 5MBS / Rel-17**

*Abstract of the contribution: This document proposes the architecture for 5MBS interworking with eMBMS.*

# 1 Introduction

The conclusions for KI#9 in TR 23.757 read as follows:

*For 5MBS multicast, in order to minimize the interruption of public safety services upon transition between NR/5GC and E-UTRAN/EPC the following applies:*

*For a 5MBS multicast session two scenarios are considered:*

*- the same service is provided via eMBMS and 5MBS. For this scenario Solution 43, which is a service based solution not needing the execution of an intermediate unicast handover, is adopted as baseline for the normative phase. This solution can be based on RRC release with redirection to redirect the UE towards the appropriate cells/frequency range.*

*NOTE 1: If the UE has other DRBs/QoS flows established before switching to EPS, the source RAN can also initiate handover.*

*NOTE 2: Solution 43 applies also to the 5MBS broadcast case.*

*- the same service is not provided via eMBMS and 5MBS. In this case, for the normative phase the following steps are adopted for 5MBS to EPS mobility:*

*- the 5MBS data shared delivery is switched to individual delivery during inter-system handover.*

*- the 5GS-EPS interworking solution of TS 23.501 [2] clause 5.17.2 is executed with an inter-system handover with MBS QoS flow(s) mapped to unicast QoS flow(s) in its associated PDU Session.*

*- After the inter-system handover has occurred, regular EPS procedures apply as the same service is not provided via eMBMS.*

*NOTE: If some further update is needed, it can be done in the normative phase.*

*- The PGW-C+SMF obtains the MBS session context when UE joins 5G MBS.*

*- After a possible subsequent EPS to 5MBS mobility, the PGW-C+SMF can again apply shared delivery to the UE.*

*For an eMBMS session started in EPS and subsequent EPS to 5MBS mobility, the following steps are adopted for the normative phase:*

*- Before EPS to 5MBS mobility, the application may trigger the switching the multicast data receiving from eMBMS to unicast bearer as defined in TS 23.468 [5].*

*- the 5GS-EPS interworking solution of TS 23.501 [2] clause 5.17.2 is executed with an inter-system handover.*

*- the UE can join the 5MBS multicast service after EPS to 5MBS mobility.*

This paper proposes the architecture for 5G MBS, corrects clause 6.8 which was mistakenly approved in SA2#143E and aligns it with the conclusion of the FS\_5MBS TR.

# 2 Text proposal

It is proposed to capture the following changes in TS 23.147:

>>>>BEGINNING OF CHANGES<<<<

## 5.2 General architecture for interworking with LTE

Interworking between 5MBS and eMBMS at service layer functionality applies in cases where the same Multicast/Broadcast service is provided via eMBMS and 5MBS.

Figure 5.2-1 depicts the shows the system architecture for interworking between E-UTRAN/EPC eMBMS and 5GS 5MBS at service layer, with collocated BM-SC and MBSF/MBSTF functionalities.



**Figure 5.2-1: 5MBS-eMBMS interworking system architecture**

The BM-SC+MBSF/MBSTF exposes common xMB/MB2(-C and -U) reference points to the NEF and/or AF/AS. A common TMGI is used towards the AF/AS. The TMGI is also used as identifier for transport over E-UTRAN/EPC.

NOTE: xMB-C/U are both legacy reference points and 5GS reference points

>>>>NEXT CHANGE<<<<

## 6.8 Interworking with MBMS over E-UTRAN for public safety services

In order to minimize the interruption of services, upon mobility between 5MBSand eMBMS, the following applies.

If the same multicast service is provided via eMBMS in E-UTRAN and 5MBS, interworking is supported at service layer.

- The UE is always configured with a common TMGI regardless of whether the UE is discovering and joining the MBMS/MBS service via E-UTRAN or NR. When the UE camps on NR, the UE establishes an MBS session context using the MBS context ID = TMGI. When the UE camps on E-UTRAN, the UE uses procedures as defined in TS 23.246 [4] for MBMS reception for the TMGI.

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If the same multicast service is not provided via eMBMS in E-UTRAN, interworking with EPS is based on Individual delivery. In this case, 5GS-EPS interworking as described in TS 23.501 [5] clause 5.17.2 with the following additions for 5MBS:

- the 5MBS data shared delivery is switched to individual delivery during inter-system handover. Source RAN performs HO as per TS 38.300 [x].

- 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).

- Before EPS to 5GS mobility, the application may trigger the switching the service receiving from eMBMS to Individual MBS traffic delivery over EPS as defined in TS 23.468 [10]. The UE can join the MBS service after EPS to 5GS mobility.

>>>>NEXT CHANGE<<<<

## 7.4 MBS procedures for inter System Mobility

### 7.4.1 Inter-system mobility with interworking at service layer

For inter-system mobility with interworking at service layer the UE is instructed to switch between 5MBS and eMBMS:

- Mobility from 5MBS to eMBMS.

When moving to E-UTRAN/EPC the UE initiates procedures as defined in TS 23.246 [4] to receive MBMS service for the TMGI(s).

When moving to E-UTRAN/EPC, the MBS session context is removed locally at the UE without the need for explicit SM signalling.

For connected mode mobility, the source NG-RAN can remove the UE from the multicast session context(s) if it exists. If the UE is the last one in any multicast session context, the source NG-RAN performs the Multicast user plane distribution release for the multicast service (see step 17 to step 25 of clause 6.3.2.3).

NOTE 1: If the UE has one or more unicast PDU Sessions moving to EPS and if the handover procedure from 5GS to EPS using N26 interface described in clause 4.11.1.2.1 of TS 23.502 [8] is used, the NG-RAN can use the UE Context Release Command message sent by the AMF (i.e. step 21c) to trigger the removal of the UE from the multicast session context(s), if it exists, or the removal of the whole multicast session context (if the UE is the last one in the multicast session).

For 5GS to EPS Idle mode mobility using N26 interface the AMF gets notified from HSS+UDM and then releases the PDU Session(s) not expected to be transferred to EPC (see TS 23.502 [8], clause 4.11.1.3.2, in Step 15-15c).

For 5GS to EPS Idle mode mobility with no N26, when the UE reaches the EPS and performs E-UTRAN attach, according to TS 23.502 [8] clause 4.11.2.4.1, step 8, if the UE does not maintain registration in 5GC, upon reachability time-out, the AMF can implicitly detach the UE and release the possible remaining PDU Session(s) in 5GC.

The SMF can remove the UE from the multicast session context(s), if it exists, upon receiving a release request of the PDU Session from the AMF.

- Mobility from eMBMS to 5MBS.

When the UE has moved to NR/5GC it triggers the multicast context and multicast flow setup/modification via PDU Session Modification procedures as defined in clause 6.3.2.1 to receive 5G MBS transport for the TMGI(s).

>>>>END OF CHANGES<<<<