**SA WG2 Meeting #S2-144E S2-210xxxx**

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**Source: vivo**

**Title: UE requested multicast session join procedure**

**Document for: Approval**

**Agenda Item: 8.9.2**

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

*Abstract of the contribution: UE requested multicast session leave procedure.*

# 1 Introduction

This paper proposes update of multicast session join.

It has been agreed that SMF-centric way is used, the PDU Session Modification procedure is extended to support MBS. It is better to reuse the steps of PDU Session Modification procedures as possible as we can.

**Proposal 1: reusing steps of PDU Session Modification procedure as possible as we can.**

Considering that UE may join into multiple MBS Sessions, it is proposed that the SMF indicates all MBS Session IDs that the UE joined in to the RAN to update the UE context related to MBS. If the update includes new MBS Session ID, then it is for join, otherwise it is for leaving.

**Proposal 2: considering UE can join into multiple MBS Sessions, CN indicates multiple MBS Session IDs to RAN.**

In order to simplify the procedure, the multicast session creation in MB-SMF is done by procedure described in 7.1, and SMF only can invoke update, this will remove the complexity of multiple creation operation.

**Proposal 3: The multicast session is created by pre-configuration or by AF/AS, SMF only perform update during join/leave.**

# 2 Proposal

It is proposed to approve following changes in TS 23.247:

\* \* \* \* First change (new text) \* \* \* \*

7.2.1 Multicast session join and session establishment procedure

7.2.1.1 General

Session Join procedure is used by UEs to inform the 5GC of the UE interest in an MBS Session. The user plane management is described in clause 6.6.

7.2.1.2 Establishment of a PDU Session that can be associated with multicast session(s)

A PDU Session associated with multicast session(s) is established using the procedures as specified in TS 23.502 [6] clause 4.3.2.2 with the following differences:

- In step 1, in the NAS Message to the AMF, the UE includes an S-NSSAI, a DNN, or both that support multicast services for establishing a PDU Session associated with multicast session(s);

- In step 2, based on the indication of establishing a PDU Session associated with multicast session(s), the AMF selects an SMF capable of handling multicast sessions based on subscription data as well as locally configured data or a corresponding SMF capability stored in the NRF. For indirect discovery, the AMF requests the SCP to select an SMF capable of handling multicast sessions.

7.2.1.3 Multicast session join procedure

The following steps are executed before the UE requests to join the MBS session:

* The MBS Session context has been created, e.g., requested by AF/AS described in clause 7.1, or by pre-configuration.
* The UE registers in the PLMN and establishes a PDU session.
* The UE has known at least the MBS Session ID of a multicast group that the UE can join, e.g. via announcement.



**Figure 7.2.1.3-1: PDU Session modification for multicast**

1. To join the multicast group, the UE sends the PDU Session Modification Request (MBS Session ID, join indicator). MBS Session ID indicates the multicast group that UE wants to join.

2. [Optional] Per the received MBS Session ID, the SMF authorizes the request, see clause 6.1.1. If authorization check fails, the SMF indicates cause value in the NAS message sent to the UE and goes to step 5.

3. [Optional] If SMF has no information about the multicast context for the indicated MBS Session, SMF checks at the NRF whether a multicast context for the indicated MBS Session exists in the system, by using Nnrf\_NFDiscovery\_Request request (MBS Session ID). The NRF responses with Nnrf\_NFDiscovery\_Request response. If the multicast context already exists in the NRF, the response includes MB-SMF information. If MB-SMF information is not received, the SMF indicates cause value in the NAS message sent to the UE and goes to step 5.

Editor's note: More consideration on how to prevent denial of service attack type situation when first UE joining the multicast group, triggers the MB-UPF to join the multicast tree towards the content provider is FFS.

4. [Optional] By using Nsmf\_MBSSession\_Update request (MBS Session ID), SMF interacts with MB-SMF to retrieve multicast QoS flow information of the indicated MBS session when the SMF does not act as the MB-SMF serving the MBS Session. If the multicast session is not activated, the SMF indicates cause value in the NAS message sent to the UE in step 5.

5. If the multicast session is activated, the SMF responds to AMF through Nsmf\_PDUSession\_UpdateSMContext response (N2 SM information (PDU Session ID, MBS Session ID(s), multicast QoS flow information, updated PDU Session information, mapping information about unicast QoS flow, N1 SM container (PDU Session Modification Command)) to:

Editor's note: Whether MB-SMF information needs to be sent to NG-RAN is FFS.

- manage MBS session contexts for the indicated MBS sessions in the NG-RAN; and

- inform about the relation including the mapping information between the multicast session contexts and the UE's PDU session to NG-RAN.

Based on operator policy, the SMF may prepare for individual delivery fall-back. The SMF maps the QoS information of the multicast QoS Flows into PDU Session's QoS Flow information.

In other cases, the N2 SM information does not include information related to resource establishment sent to the NG-RAN, and the N1 SM container includes PDU Session Modification Reject with cause value.

Editor's note: Details information included in N2 SM information will be aligned with RAN WG3.

Editor's note: Whether it needs to inform about the relation including the mapping information between the multicast context and the UE's PDU session to UE is FFS.

6. The N2 message, which includes the N1 SM container, is sent to the NG-RAN.

The NG-RAN uses the MBS Session ID(s) to determine that the PDU Session Modification procedures corresponds to the indicated multicast sessions.

If the NG-RAN supports MBS, the unicast QoS flow information identified in the mapping information about unicast QoS flow is not used to allocate the radio resource and resource between NG-RAN and UPF.

NOTE: It is NG-RAN that decides whether radio resource is allocated or not.

When the NG-RAN receives an MBS Session ID but MBS Session context does not exist for that MBS Session ID, the NG-RAN uses the included multicast QoS flow information to allocate resources to serve this multicast session. Otherwise, the indicated MBS Session has been established before. The NG-RAN can use those allocated resource for MBS Session data packet transferring to UE.

7. The NG-RAN performs AN specific resource configuration procedure with the UE. As part of this, the N1 SM container is provided to the UE.

8. The NG-RAN sends N2 message to SMF via AMF. If the NG-RAN does not support MBS, 5GC Individual MBS traffic delivery method is used, in this case, the N2 message does not include any information related to MBS. Otherwise, 5GC Shared MBS traffic delivery method is adopted, in this case, the N2 message includes MBS Session ID(s) and optionally other information related to the multicast sessions for resource management.

9. [Optional] If MBS Session ID(s) are received, the SMF realizes that the NG-RAN node supports MBS and 5GC Shared MBS traffic delivery method is adopted. When the SMF does not act as the MB-SMF serving the MBS Session identified by additional MBS Session ID that UE has not joined into, the SMF interacts with the MB-SMF serving the additional MBS Session ID to establish resource between NG-RAN and MB-UPF for 5GC Shared MBS traffic delivery method, or between UPF and MB-UPF for 5GC Individual MBS traffic delivery method.

The MB-SMF may update the MB-UPF to install/update forwarding rule (FWR) for the multicast session. When the FWR is installed in the MB-UPF and tunnel is not used between the MB-UPF and the content provider, the MB-UPF shall join into the multicast distribution tree towards the content provider.

10. The SMF responds to the AMF.

7.2.1.4 Multicast session join procedure involving MBSF

Editor's note: Details are FFS.

\* \* \* \* End of changes \* \* \* \*