**SA WG2 Meeting #S2-142E S2-2008802**

**November 16 ~ 20, 2020, Elbonia**

**Source: vivo**

**Title: Multicast session leave procedure**

**Document for: Approval**

**Agenda Item: 8.9**

**Work Item / Release: FS\_5MBS / Rel-17**

*Abstract of the contribution: Multicast session leave procedure.*

# 1 Introduction

This paper proposes procedure of Multicast session leave.

# 2 Discussion

According to the call flow in clause 8 of TR 23.757, the following procedure for session leave is proposed.

# 3 Proposal

It is proposed to approve following changes:

\* \* \* \* First change \* \* \* \*

### 7.1.2 Multicast session leave procedure

The session leave operation is triggered by UE for leaving the multicast distribution tree towards the content provider, which triggers the 5GC to release PDU Session resources related to the multicast session towards the UE if used or intend to be used, and decrease the user count towards the RAN node serving the UE if UE is in connected state.

The following call flow depicts the multicast session leave procedure.

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**Figure 7.1.2-1: Multicast session leave**

1. The UE registers in the PLMN (see clause 4.2.2.2 of TS 23.502 [8]) and requests the establishment of a PDU session (see clause 4.3.2.2 of TS 23.502 [8]).

2. [Optional] The UE may request to stop receiving multicast data of a multicast session provided by the multicast service over application layer. The UE may deregister to the multicast service over application layer.

3. [Optional] The content provider may send request for multicast session configuration to the NEF (MBSF) as described in clause 7.0.1.

If UE does not request to stop receiving multicast data over use application layer as described in step 3, the following steps are performed, else the following steps may be performed.

4. The UE sends the PDU Session Modification Request (MBS Session Leave (MBS Session ID)) either upon a request from higher layers or upon a detection by lower layers of UE leaving a multicast group (i.e., detection of IGMP or MLR data, or detection of the content change of these data). The MBS Session ID may be the source specific multicast address in the IGMP/MLD data, or the TMGI from higher layers.

If UE supports UP based session join/leave, instead of sending the NAS message, the UE sends IGMP/MLD leave over the PDU Session established in step 1 and continues from step 7.

Editor’s note: Whether UP based join/leave needs to be standardised is FFS.

5. The AMF invokes Nsmf\_PDUSession\_UpdateSMContext (SUPI, SM Context ID, N1 SM container (PDU Session Modification Request (MBS Session Leave))) towards the SMF.

If UE uses UP based session join, instead of the Nsmf\_PDUSession\_UpdateSMContext invoked, the UPF reports the IGMP/MLD leave to the SMF.

Editor’s note: Whether UP based join/leave needs to be standardised is FFS.

6. The SMF responses to the AMF.

7. The SMF checks the binding information related to the PDU Session in the multicast session. If the binding check fails, the procedure stops.

The SMF invokes Namf\_Communication\_N1N2MessageTransfer (SUPI, N2 SM container (N2 Session Modification request (PDU Session ID, QoS flow information, MBS Session IDs, [dedicated unicast QFIs related to multicast], [mapping information between unicast QFI and multicast QFI])), N1 SM container (MBS Session Leave ACK (MBS Session ID))) to the AMF.

The QoS flow information is generated without consideration of the stored multicast QoS flow information related to the multicast session.

The MBS Session IDs indicates the multicast sessions that the UE still is interesting in.

The dedicated unicast QFIs related to multicast is used to aid the RAN node for the N3 resource reservation for the PDU Session.

Editor’s note: The mapping information between unicast QFI and multicast QFI is used for forwarding multicast traffic during handover from source gNB supporting 5MBS to target gNB not supporting 5MBS, whether to include the mapping information in the N2 SM information is determined during normative work according to the conclusion of RAN WG for the forwarding issue.

8. The AMF provides MBS Session Leave ACK to the UE due to the UE is in connected state.

9. The AMF sends the N2 Session Modification request to the RAN node.

10. The RAN node configures bearers for the PDU Session to remove resources for the multicast session.

If the on-going multicast session the UE interesting in is not indicated by the MBS Session IDs, when the RAN node supports 5MBS, the RAN node decreases the user count for the multicast session. If the RAN node decides to release the resources for the multicast session (e.g. user count equals to zero), it performs the necessary access network resource modification for removing resources for the multicast session. If multicast transport for multicast sessions is used, the RAN node leaves the multicast distribution tree of the multicast session.

Editor’s note: The details of access network resource modification should be studied in the RAN WGs.

11. The RAN node sends the N2 Session Modification response (PDU Session ID, N2 SM container ([MBS Session ID], [node status], [DL tunnel information])) towards the AMF.

If the RAN node supports 5MBS, the response includes the MBS Session ID that the UE is leaving. If the RAN node is configured to use unicast transport for multicast sessions and is leaving the multicast distribution tree, the DL tunnel information (IP address of the RAN node and the DL tunnel ID) is included, if the RAN node is configured to use multicast transport for multicast sessions and is leaving the multicast distribution tree, the node status is included to indicate "UP node leave".

The RAN node reserves N3 resources for the PDU Session without consideration of those QoS flows indicated by the dedicated unicast QFIs related to multicast if received.

If the RAN node does not support 5MBS, the response does not include MBS Session ID, node status, and DL tunnel information.

12. The AMF invokes Nsmf\_PDUSession\_UpdateSMContext (SUPI, N2 SM container) towards the SMF.

When MBS Session ID is included in the N2 Session Modification response, then the 5GC Shared MBS traffic delivery method was used, the SMF reserves N3 resources for the PDU Session without consideration of those QoS flows indicated by the dedicated unicast QFIs related to multicast if sent. When MBS Session ID is not included in the N2 Session Modification response, then the 5GC Individual MBS traffic delivery method was used.

The SMF removes the binding information related to the PDU Session and the multicast session that the UE is leaving.

13. [Optional] The SMF invokes Nsmf\_MBSession\_Release (MBS Session ID, node status, [DL tunnel information]) towards the MB-SMF when following condition is met:

- If the 5GC Shared MBS traffic delivery method was used as well as the DL tunnel information or node status is received in the N2 Session Modification request;

- If the 5GC Individual MBS traffic delivery method was used.

If the DL tunnel information or "UP node leave" indication is received in the N2 Session Modification request, or if it is the last UE that the UPF served for the multicast session with 5GC Individual MBS traffic delivery method, the node status indicates "UP node leave". If it is the last UE that the SMF served for the multicast session, the node status indicates "CP node leave". If both are met, then the node status indicates "CP node leave" and "UP node leave".

If the DL tunnel information is received in the N2 Session Modification request, the received DL tunnel information is included, otherwise, if it is the last UE that the UPF served for the multicast session with 5GC Individual MBS traffic delivery method, when the UPF is configured to use unicast transport for multicast sessions, the DL tunnel information (IP address of the UPF and the DL tunnel ID) is included, when the UPF is configured to use multicast transport for multicast sessions, the SMF configures the UPF to leave the multicast distribution tree of the multicast session.

14. [Optional] If DL tunnel information is received, the MB-SMF removes the DL tunnel information from the multicast distribution tree, if "UP node leave" indication is received, the MB-SMF decreases the count of UP node by 1.

If "CP node leave" indication is received, the MB-SMF removes the SMF ID from the multicast session context.

15. [Optional] The MB-SMF configures MB-UPF to update transmission resources of the multicast session. If the last node leaves the multicast distribution tree of the multicast session, the MB-SMF configures MB-UPF to stop transmission of the data for the multicast session, and the MB-SMF may also configure the MB-UPF to leave the multicast distribution tree towards the content provider.

For unicast transport of the multicast session, the MB-UPF stops data forwarding to the destinations (UPF or RAN node) corresponding to the received DL tunnel information.

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