**3GPP TSG-WG SA2 Meeting #144E e-meeting *S2-210xxxx***

**Elbonia, April 12 – 16, 2021 (revision of S2-210xxxx)**

**Source: Huawei, HiSilicon**

**Title: TS 23.246: MBS Session Join and Establishment**

**Document for: Approval**

**Agenda Item: 8.9**

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

*Abstract: This contribution updates the main procedure for MBS Session Join and Establishment for MBS.*

# 1. Introduction/Discussion

In SA2 #143E meeting, the basic call flow of clause 7.2.1 was agreed. The leftover issue includes:

- How NG-RAN 5MBS capability is made know.

- The steps for establishing DL UP tunneling. Step 7 is put as a conditional step for unicast transport for MB-N3. And add EN about how to make LL IP Multicast Address and QoS Profile available in NG-RAN.

This document tries to resolve the open issues above and specify the details.

# 2. Text Proposal

It is proposed to capture the following changes vs. TS 23.247.

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

7.2 MBS procedures for multicast Session

7.2.1 MBS 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 indication of establishing a PDU Session associated with multicast session(s);

Editor's note: Whether an explicit indication of establishing a PDU Session associated with multicast session(s) is required is FFS. For example, an S-NSSAI or DNN supporting multicast services may be used instead.

- 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 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 MBS join and Session establishment procedure

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

* The MBS Session has been configured. Details see 7.1.1.
* 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). MBS Session ID indicates the multicast group that UE wants to join.

2. Per the received MBS Session ID, the SMF recognize this is MBS Session join request. The SMF authorizes MBS Session join request, see clause 6.1.1.

3. 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 (MBS Session ID). If a multicast context already exists in the NRF, the NRF responses with Nnrf\_NFDiscovery response (MB-SMF ID).

NOTE x1: SMF and MB-SMF can be identical.

Editor's note: Whether SMF acting as the MB-SMF is needed and how it works if needed is FFS.

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. By using Nsmf\_MBSSession\_Create request (MBS Session ID), SMF interacts with MB SMF to retrieve multicast QoS flow information of the indicated MBS session.

5. SMF responds to AMF through Nsmf\_PDUSession\_UpdateSMContext response(N2 SM information (PDU Session ID, MBS Session ID, MB-SMF ID, multicast QoS flow information, updated PDU Session information, mapping between unicast QoS flow and multicast QoS flow information), N1 SM container (PDU Session Modification Command) to:

- create a MBS session context for the indicated MBS session in the RAN, if it does not exist already; and

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

Based on operator policy, the SMF may prepare for individual delivery fall-back. The SMF maps the received QoS information of the multicast QoS Flow into PDU Session's QoS Flow information, and includes the information of the QoS Flows and the mapping information about the QoS Flows in the SM information sent to RAN.

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 PDU session modification command information is sent to the RAN.

If the MBS is not supported by NG-RAN, 5GC individual MBS traffic delivery may be used. Otherwise, 5GC shared MBS traffic delivery is adopted.

The NG-RAN uses the MBS Session ID to determine that the PDU Session Modification procedures corresponds to the indicated multicast session.

If the multicast QoS information is received, the associated unicast QoS flow information is not used to allocate the radio resource.

NOTE x2: 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 use the included MBS Session QoS 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.

[Conditional] If unicast transport is applied for the MB-N3 tunnel, step 7 is used for 5GC shared MBS traffic delivery and shared tunnel has not been established for the indicated MBS session:

Editor's note: The name of MB-N3 is FFS.

7a. NG-RAN signals a message towards AMF, and the information for establishing the tunnel for DL MBS transmission. MB-SMF ID, Multicast context/group ID/MBS Session ID are included.

If the NG-RAN node uses a unicast transport for shared delivery, it allocates a downlink tunnel ID for the reception of MBS data and includes the downlink tunnel information in the request.

7b. AMF invokes Nsmf\_MBSSession\_Create request (MBS Session ID) towards the indicated MB-SMF.

7c. If downlink tunnel ID is included, MB-SMF configures MB-UPF to transmit the MBS data for multicast towards NG-RAN using the downlink tunnel ID.

7d. MB-SMF responds to AMF to through Nsmf\_MBSSession\_Create response

Editor’s notes: LL IP Multicast Address and QoS Profile for multicast are expected to be available earlier. How those parameters are made available in NG-RAN is FFS.

7e. AMF forwards multicast distribution session response to NG-RAN node.

8. The NG-RAN issues AN specific signalling exchange with the UE that is related with the MBS session resource reconfiguration. As part of the AN specific signalling exchange, the N1 SM container is provided to the UE.

9. The NG-RAN sends the PDU session modification response.

If the MBS is supported by NG-RAN and shared tunnel is established between the NG-RAN and MB-UPF, the accepted multicast QoS flow information is included in the N2 SM response container. Otherwise, the accepted unicast QoS flow is included in the N2 SM response container.

10. The AMF invokes Nsmf\_PDUSession\_UpdateSMContext request to the SMF.

Per the accepted multicast QoS flow information, the SMF determines that the shared tunnel is used for multicast packet transferring.

NOTE x3: If the shared tunnel is used, the interaction with UPF is not needed for the indicated MBS session

[Conditional] Step 11 is used for 5GC Individual MBS traffic delivery, e.g. the related NG-RAN does not support multicast.

If the shared tunnel between the UPF(PSA) and MB-UPF for individual delivery have not been established, step 11a to 11e are executed.

11a. If unicast transport for the multicast data between UPF and MB-UPF is to be used, SMF allocates a downlink tunnel endpoint and configures UPF. Or, SMF requests UPF to allocate a downlink tunnel ID.

11b. SMF invokes Nsmf\_MBSSession\_Update request (MBS Session ID, DL tunnel info) towards MB-SMF that includes MBS Session ID and downlink tunnel info of UPF, for establishing the multicast session distribution between MB-UPF and UPF.

11c. MB-SMF configures MB-UPF to transmit the multicast distribution session towards UPF using the received downlink tunnel ID.

11d. MB-SMF responds to SMF through Nsmf\_MBSSession\_Update response. For multicast transport between MB-UPF and UPF, it also indicates in the downlink tunnel information the transport multicast address for the multicast session.

11e. For multicast transport between MB-UPF and UPF, SMF configures UPF to receive the multicast distribution session and forward the data within unicast transport.12. The SMF invokes Nsmf\_PDUSession\_UpdateSMContext response to the AMF.

12. The SMF invokes Nsmf\_PDUSession\_UpdateSMContext response to the AMF.

13. MB-UPF receives multicast PDUs, either directly from the content provider or via the MBSTF that can manipulate the data.

Step 14 to 16 are for 5GC shared MBS traffic delivery:

14. MB-UPF sends multicast PDUs in the N3/N9 tunnel associated to the multicast distribution session to the RAN. There is only one tunnel per multicast distribution session and NG-RAN node, i.e., all associated PDU sessions share this tunnel.

15. The NG-RAN selects PTM or PTP radio bearers to deliver the multicast PDUs to UEs that joined the multicast group.

16. The NG-RAN performs the transmission using the selected radio bearer.

Step 17 to 19 are for 5GC individual MBS traffic delivery:

17. MB-UPF sends multicast PDUs in the N3/N9 tunnel associated to the multicast distribution session to UPF. There is only one tunnel per multicast distribution session and destination UPF, i.e., all associated PDU sessions share this tunnel.

18. UPF forwards the multicast data via unicast.

19. The NG-RAN forwards the multicast data via unicast.

NOTE x4: Details of the DL MBS data transmission could refer to clause 6.7.

7.2.1.4 MBS join and Session establishment procedure involving MBSF

Editor's note: Details are FFS.

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