3GPP TSG-WG SA2 Meeting #139E e-meeting *S2-2003965r07*

Elbonia, June 1 – 12, 2020 (revision of S2-200xxxx)

**Source: Huawei, HiSilicon, Nokia**

**Title: KI1: Update to Solution #3: Add support for UE leaving MBS**

**Document for: Approval**

**Agenda Item: 8.9**

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

*Abstract: This contribution proposes to extend Sol. 3 with the support for a UE to leave Multicast/Broadcast service.*

1. Discussion

This contribution proposes a solution for UE to leave multicast service and assumes an enhancements of Solution #3 (see TS 23.757 clause 6.3).

# 2. Text Proposal

It is proposed to capture the following changes to TR 23.757 Solution 3.

\* \* \* \* Beginning of changes \* \* \* \*

6.3.2.x UE Leaves Multicast Service via PDU Session Modification Procedure

NOTE 1: The message names in the procedures below are descriptive.



**Figure 6.X.2.1-1: PDU session modification for multicast leave.**

1. The UE joins one or multiple multicast services as specified in clause 6.3.2.1.

At any time the UE can determine to leave the multicast service.

Alternative 1: user plane signalling:

2. The UE sends the user plane message (e.g., the IGMP Leave) when the UE want to leave one or multiple multicast services. The user plane message shall include the related information about the multicast service to be leaving, such as the multicast address.

3. The reception of the leave message triggers the UPF to notify the SMF. The SMF initiates PDU session modification procedure upon the reception of the notification from the UPF.

Alternative 2: control plane signalling:

4. The UE sends the PDU Session Modification Request when the UE wants to leave one or multiple multicast services. The PDU Session Modification Request shall include the related information about the multicast service to be leaving, such as the multicast address.

5. The AMF invokes Nsmf\_PDUSession\_UpdateSMContext (SM Context ID, N1 SM container (PDU Session Modification Request with the associated multicast service information (e.g., leave indication, multicast service identity, etc.))).

NOTE 2: Based on the MBS Session Context stored at the SMF, SMF reject the PDU Session Modification Request if the UE is no longer within that multicast group.

If the UE is receiving multicast via unicast PDU session steps 6 to 14 apply:

If SMF1 and SMF2 are different and the multicast data are not needed to be distributed via unicast distribution within a PDU session to other UEs served by UPF1 steps 6 to 8 apply, i.e. the shared tunnel between the UPF1 and UPF2 is not needed: The SMF1 determine the corresponding SMF2 based on the MBS Session Context and the multicast group UE want to leave.

6. The SMF1 sends a request to terminate the multicast distribution [Multicast context/group ID] to SMF2, .

7. Based on the information received in step 6, i.e. the DL CN Tunnel Information, SMF2 updates the multicast session context identified by the Multicast context/group ID and configures the UPF2 to no longer distribute multicast data towards UPF1.

8. The SMF2 acknowledges the request to terminate the multicast distribution to SMF1 as the response to step 6,

9. SMF1 reconfigures UPF1 to terminate the distribution of multicast data via the unicast PDU session and when steps 6 to 8 were executed also to release the resources for the reception of the multicast data.

If dedicated QoS flow are used for the unicast transfer of the multicast data, steps 10 to 14 apply

10. The SMF1 request the AMF to notify the RAN node to release the QoS flows previously used to transport the mulicast data using the Namf\_Communication\_N1N2Message (N2 SM information) Transfer service. In the N2 SM information, it includes unicast QoS flow information.

11. The session modification request is sent to the RAN. The N1 SM container (PDU Session Modification Command) is provided to the UE.

12. The RAN performs the necessary radio resource modification.

13. The RAN sends the session modification response to AMF.

14. The AMF transfers the session modification response received in step 13 to the SMF1 via the Nsmf\_PDUSession\_UpdateSMContext service

If the UE is receiving multicast via multicast distribution steps 15 to 24 apply:

15. The SMF request the AMF to notify the RAN node that the UE left the indicated multicast group using the Namf\_Communication\_N1N2Message (N1SM container (PDU Session Modification Command (PDU Session ID , multicast information ([Multicast Context ID], multicast address,)), N2 SM information) Transfer service.

In the N2 SM information, it includes the multicast flow information (multicast QoS Flow ID and associated QoS information), and multicast service identity UE want to leave.

NOTE: If mapped unicast QoS flow information, association between the unicast QoS flow and multicast QoS flow, and Unicast information (i.e., QoS rules for Unicast flows) in the N1 SM container are added for multicast distribution, then this information also needs to be deleted at this stage

16. The session modification request is sent to the RAN. The request include a multicast service identity and multicast flow information. The N1 SM container (PDU Session Modification Command) is provided to the UE.

The RAN use the multicast service identity to remove the UE from the multicast session context. Also in the UE context the related multicast QoS flow and associated unicast QoS flow information are removed.

17. The RAN performs the necessary radio resource modification.

Editor´s note: Option A and B are only introduced temporarily, and a single solution should be selected, Solutions for joining and leaving should be aligned.

Following steps describe option A and B respectively:

OPTION A (from step 18a to step 22a RAN communicates with SMF1, SMF1 further interacts with SMF2):

18a. The RAN sends the session modification response to AMF. In the N2 SM information, it may include an indication that shared downlink tunnel releasing (e.g., no any UE in the related multicast session context at the indicated RAN node) and associated multicast service identity towards SMF.

19a. If the SMF receives the shared downlink tunnel releasing indication, the SMF notify the corresponding SMF2.

Step 20a to step 22a are only executed if the shared downlink tunnel is between UPF2 and the RAN is to be released:

20a. The SMF sends an N16 message to SMF2, including the indication that the shared downlink tunnel between the UPF2 and indicated RAN node is to be released and the multicast service identity associated with the downlink tunnel.

21a. The SMF2 updates the multicast session context identified by the multicast service identity and request the UPF2 release the corresponding shard downlink tunnel resource.

22a. The SMF2 response to the SMF to confirm the shard downlink resource at the UPF2 has been released.

OPTION B(from step 18b to step 24b RAN communicates with SMF2, no interaction between SMF1 and SMF2):

Based on the MBS Session context stored at the RAN, ibb

18b. RAN node selects the AMF to reach SMF2 and signals a request for the user plane distribution release towards that AMF [SMF2 ID, Multicast context/group ID, downlink tunnel information].

19b. AMF forwards the request towards the SMF2

20b: For unicast transport of the multicast distribution session, SMF2 configures UPF2 to terminate transmission of the multicast distribution session towards the RAN node.

21b: SMF sends a multicast distribution session release response to AMF.

22b: AMF forwards multicast distribution session release response to RAN node

23b. The RAN sends the session modification response to AMF..

24b. The AMF transfers the session modification response received in step 23 to the SMF1 via the Nsmf\_PDUSession\_UpdateSMContext service.

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