**SA WG2 Meeting #141E (e-meeting) S2-2006837**

**Oct 12 – Oct 23, 2020, Elbonia**

**Source: CATT**

**Title: KI #7, Sol #18: Update to resolve ENs**

**Document for: Approval**

**Agenda Item: 8.9**

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

*Abstract of the contribution: This contribution proposes updates to Solution #18 for Key Issue #7.*

1. Discussion

There are Editor's notes in solution #18 for Key issue#7, which are listed and discussed as follows:

Editor's note: Assumed baseline architecture is FFS.

The proposed solution that the CN provides MBS assistance information to the NG-RAN applies to both baseline architecture 1 and 2, and the SMF refers to the MB-SMF which controls the MBS session.

Editor's note: It is FFS how the Number of UEs receiving or interested in the MBS service can be determined if those UEs are served by multiple SMFs.

As clarified above, the SMF in the solution refers to the MB-SMF which controls the MBS session, and number of UEs receiving or interested in the same MBS service (i.e. MBS session) is determined by the only one MB-SMF based on the report from the AMF or analytics information from the NWDAF. No multiple SMFs are involved. So it is proposed to remove this Editor’s note.

Editor's note: It is FFS whether a single suggested number of UEs for multicast delivery is appropriate for all cells, given that they can be in different coverage and load conditions. RAN coordination is required

It is true that one suggested number of UEs for multicast delivery may not fit all the cells, given the different local conditions (e.g. radio condition, load, etc.) of different cells. So the RAN coordination is needed, i.e. the RAN also takes into account of its local condition (e.g. radio condition, load, etc.) when selecting the PTP or PTM delivery method using the assistance information; while how the RAN performs such coordination is implementation specific. So it is proposed to convert this Editor's note into a Note to clarify that the coordination is needed but implementation specific.

2. Proposal

It is proposed to include the following changes in TR 23.757.

\*\*\*\*\* Start of 1st Change \*\*\*\*\*

## 6.18 Solution #18: MBS assistance information to RAN for delivery mode switching

### 6.18.1 Functional description

This solution addresses Key Issue #7 "Reliable delivery mode switching between unicast and multicast". The solution applies to both baseline architecture 1 and 2, wherein the SMF refers to MB-SMF.

The NG-RAN needs to determine the delivery method of AN resources (i.e. PTP or PTM delivery method) for the MBS service, and may dynamically switch the delivery method from PTM to PTP, or vice versa.

To assist the NG-RAN in deciding the delivery mode of AN resources for MBS services, the CN provides MBS assistance information to the NG-RAN. The MBS assistance information may include:

- suggested number of UEs for multicast delivery. When the number of UEs receiving or interested in the MBS service in a cell or in the NG-RAN node reaches this number, multicast delivery method is preferable;

- number of UEs receiving or interested in the MBS service in a cell of the NG-RAN node or in the NG-RAN node, based on the statistics or prediction by the CN;

- delivery method information for an MBS session or QoS flow, e.g. whether PTP and/or PTM delivery method are allowed;

- NG-RAN performance, e.g. congestion status, communication performance, based on the statistics or prediction by the CN;

- suggested delivery method based on NG-RAN performance;

- information of MBS services/groups subscribed by the UE, e.g. TMGI;

- UE capabilities, e.g. whether the UE supports multicast/broadcast delivery method;

- etc.

Editor's note: Whether the above information from the CN can assist in RAN decision of switching between PTP and PTM needs to be confirmed by RAN group.

The MBS assistance information is determined by the CN based on MBS service information, MBS related PCC policy, UE subscription and capabilities on MBS services, etc. The AF provides MBS service parameters, which may include the information of allowed/preferred delivery method(s) taking into account of the MBS service/application requirements, to the PCF. The PCF, based on MBS service information and other information (e.g. network performance, local configuration), decides the MBS related PCC policy and provides to the SMF. Based on the MBS related PCC policy or local policy, UE subscription data, UE capabilities, etc., the SMF decides the MBS assistance information.

The MBS assistance information can be determined and dynamically updated also based on network analytics. That is, the AF, PCF and SMF can subscribe or request from the NWDAF the analytics information on "Service Experience", "Network Performance" and/or "User Data Congestion Analytics", etc., as specified in TS 23.288 [9], and then determine/update the MBS service parameters, MBS related PCC policy and MBS assistance information based on the analytics information.

The MBS assistance information can be provided by the SMF to the RAN via the AMF during the procedures of MBS service configuration, session start and/or PDU session establishment/modification associated with MBS service, etc. Based on the MBS assistance information, the NG-RAN determines for the MBS session the delivery method of AN resources, or dynamically switches the delivery method of AN resources from unicast to multicast (or vice versa).

Table 6.18.1-1 gives more information on MBS assistance information, including NF(s) generating the MBS assistance information, descriptions and recommendation for specification in Rel-17.

Table 6.18.1-1: MBS assistance information

|  |  |  |  |
| --- | --- | --- | --- |
| MBS assistance information | NF(s) generating this MBS assistance information | Descriptions | Recommended for specification in Rel-17 |
| Suggested number of UEs for multicast delivery | PCF/SMF | When the number of UEs receiving or interested in the MBS service in a cell or in the NG-RAN node reaches this number, multicast delivery mode is preferable.  Decided by the PCF based on e.g. local policy, analytics information, and provided to the SMF (if dynamic PCC is deployed); or decided by the SMF based on local policy | Y. Centralized policy may simplify NG-RAN implementation. |
| Number of UEs interested in the MBS service/session | SMF | The statistics or predicted number of UEs interested in the MBS service/session in a cell or in the NG-RAN node.  Decided by the SMF based on the report from the AMF or analytics information from the NWDAF. | N. Can be counted locally in NG-RAN. |
| Delivery method information for an MBS session or QoS flow, e.g. whether PTP and/or PTM delivery mode are allowed | PCF/SMF | Only allowed delivery method can apply to the MBS Session or QoS flow.  Decided by the PCF based on e.g. service information from the AF and/or operator policy, and provided to the SMF (if dynamic PCC is deployed); or decided by the SMF based on local policy. | Y. Service/operator specific requirements can be provided. |
| NG-RAN performance, e.g. congestion status, communication performance, based on the statistics or prediction by the CN | NWDAF | NG-RAN can decide the delivery mode based on NG-RAN performance (and other information).  Generated by the NWDAF, e.g. based on the Network Performance analytics as defined in TS 23.288, and provide to the SMF and PCF. | N. Can be measured locally in NG-RAN. (Prediction is unavailable.) |
| Suggested delivery mode based on NG-RAN performance | PCF/SMF | Recommended delivery mode (PTP or PTM) based on NG-RAN performance.  Decided by the PCF based on e.g. local policy and analytics information, and provided to the SMF (if dynamic PCC is deployed); or decided by the SMF based on local policy | N. Can be decided by NG-RAN. |
| Information of MBS services/groups subscribed by the UE, e.g. TMGI | SMF | Only allow the UE to join an MBS Session of the subscribed service(s)/group(s).  Decided by the SMF based on the MBS related subscription data from the UDM/UDR. | Y. Related to whether PTM delivery method can be used for the UE. |
| UE capabilities, e.g. whether the UE supports PTM delivery mode | SMF | The PTM delivery mode can be used only if the UE supports it.  Decided by the SMF, e.g. based on the UE MBS capability indicated in the NAS message. | Y. Related to whether PTM delivery method can be used for the UE. |

NOTE 1: The suggested number of UEs for multicast delivery may be dynamically adjusted based on the analytics information, e.g. network performance analytics, from the NWDAF, to cope with e.g. different load conditions in different RAN coverage.

NOTE 2: The suggested number of UEs for multicast delivery may not be appropriate for all the cells, considering e.g. different radio and/or load conditions in different cells. When selecting the PTP or PTM delivery method using the assistance information, the RAN also takes into account of its local condition (e.g. radio condition, load, etc.). How the RAN performs such coordination is implementation dependent.

### 6.18.2 Procedures



Figure 6.18.2-1: Provision of MBS assistance information to RAN

0. The AF, PCF and/or SMF may subscribe or request network analytics information on "Service Experience", "Network Performance" and/or "User Data Congestion Analytics", etc., from the NWDAF as specified in TS 23.288 [9]. Based on the analytics information:

- the AF may decide or update MBS service parameters, including the allowed/preferred delivery method (s) for the MBS service/applications, and provide to the PCF (e.g. via the UDR as specified in TS 23.502 [8] clause 4.15.6.7).

- the PCF may decide or update the MBS related PCC policy and provide to the SMF.

- the SMF may decide or update the MBS assistance information.

1. During the MBS related procedures, e.g. MBS service configuration, session start and/or PDU session establishment/modification associated with MBS service, the SMF provides the MBS assistance information to the NG-RAN via the AMF. The SMF decides the MBS assistance information based on the MBS related PCC policy from the PCF (if dynamic PCC is deployed) or local policy (if dynamic PCC is not deployed), UE subscription data from the UDM, UE capabilities if indicated by the UE in the NAS message, and/or network analytics information provided by the NWDAF, etc. Then the SMF includes the MBS assistance information in the N2 SM information of Namf\_Communication\_N1N2MessageTransfer request (or via other service operation) to the AMF, and the AMF forwards it to the NG-RAN.

2. Based on the MBS assistance information and other information (e.g. local measurement), the NG-RAN determines the delivery method of AN resources for the MBS session, or decides to switch the delivery method of AN resources from unicast to multicast (or vice versa) for an ongoing MBS session.

3. The NG-RAN establishes or modifies the AN resources for the MBS session according to the selected delivery method.

### 6.18.3 Impacts services, entities and interfaces

SMF:

- The SMF generates the MBS assistance information and provides it to the NG-RAN. The SMF may decide and update the MBS assistance information based on analytics information from the NWDAF.

NG-RAN:

- The NG-RAN decides the delivery method for AN resources of the MBS session taking into account of the MBS assistance information provided by the CN.

\*\*\*\*\* End of Changes \*\*\*\*\*