**3GPP TSG-WG SA2 Meeting #146E e-meeting *S2-2106077r03***

**Elbonia, August 16 – 27, 2021 (revision of S2-210xxxx)**

**Source: Huawei, HiSilicon**

**Title: Local MBS term clarification**

**Document for: Approval**

**Agenda Item: 8.9**

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

*Abstract: This contribution clarifies local MBS term/general description.*

# 1. Introduction/Discussion

Local MBS need to be further clarified:

* **Area Session Identifier**: Area Session ID is a specific term used for local MBS but there is no clear definition on it. A NOTE mentioning the similarity between Area Session ID and Flow ID seems not enough. Therefore, it is proposed include the description in section 3.1.
* **Multicast service area**: The original description for multicast service area saying it is "The area within which data of one or multiple Multicast session(s) may be sent". In fact multicast service area is used for local MBS scenario and it would be better to align it to the actual one used – "MBS Service Area", and update the definitions in clause 3.1.
* **Update on local MBS service area**:

The MBS service area can be cells or TAs, hence it is possible that gNB might across the edge of the MBS service area (i.e., parts of the cells/TAs of gNB belong to MBS service area, and the other parts are out of MBS service area). Since "network ceases to deliver the content data from the old MBS service areas to the UE", the NG-RAN, or SMF shall behave properly to not violate this principle.

To address this issue, one possible alternative is that NG-RAN node always getting the latest MBS service area from MB-SMF (via AMF), and the NG-RAN determines whether to configure UE(s) to receive the MBS data over air interface based on the latest MBS service area information. Moreover, NG-RAN node can further notify the associating SMF(s) if it detects any UE that moves out of MBS service area, to trigger SMF updating the associated QoS flow information and the associating QoS profile. Such alternative proceeds like "group subscription" (RAN uses MBS service area as the trigger). Note that for this case, the NG-RAN node shall have MBS capability. For NG-RAN node not supporting MBS, SMF needs to track the UEs' positions/presence of the MBS service area (by making use of "location report" procedures), and based on UEs' positions and MBS service area, or UE's presence of the MBS service area, to update the associated QoS flow information and the associating QoS profile.

It is proposed to update the current description to address the aspect mentioned-above.

* **Other Editorial issues**: For example, the description for the following condition is missing: the UE moves out the MBS service area and the cell/TA that the UE is currently camping does not belong to any MBS service area. Therefore, it is proposed to clarify such part.
* **New services of AMF**: it is proposed to have an MBS-specific service for AMF for the purpose of e.g., session activation/deactivation, session update triggered by MB-SMF. This is because the reception services provided by MB-SMF is not proper for this scenario. Enhancing current AMF service, e.g., nonUEInfoNotify cannot provide feedback. Therefore, it is proposed to define a new services of AMF.

Re-structuring the section 6.2, as it will be clearer for reading.

# 2. Text Proposal

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

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

## 3.1 Terms

For the purposes of the present document, the terms and definitions defined in TR 21.905 [1] and the following apply:

**5GC Individual MBS traffic delivery**: 5G CN receives a single copy of MBS data packets and delivers separate copies of those MBS data packets to individual UEs via per-UE PDU sessions, hence for each such UE one PDU session is required to be associated with a multicast session.

**5GC shared MBS traffic delivery**: 5G CN receives a single copy of MBS data packets and delivers a single copy of those MBS data packets to a RAN node.

**Area Session Identifier:** A unique identifier within an MBS Session used for an MBS session with location dependent content. When present, the Area Session ID together with the TMGI uniquely identify the data flow of an MBS Session in a specific MBS service area.

**Associated PDU Session:** A PDU Session associated to a multicast session that is used for 5GC Individual MBS traffic delivery method and for signalling related to a user's participation in a multicast session such as join and leave requests.

**Associated QoS Flow:** A unicast QoS Flow that belongs to the associated PDU Session and is used for 5GC Individual MBS traffic delivery method. The associated QoS Flow is mapped from a multicast QoS Flow in a multicast MBS session.

**Broadcast communication service:** A 5GS communication service in which the same service and the same specific content data are provided simultaneously to all UEs in a geographical area (i.e., all UEs in the broadcast coverage area are authorized to receive the data).

NOTE 1: For the broadcast communication service, the content provider and network may not be aware whether the authorized UEs are actually receiving the data being delivered.

**Broadcast MBS session:** An MBS session to deliver the broadcast communication service. A broadcast MBS session is characterised by the content to send and the geographical area where to distribute it.

**Broadcast service area:** The area within which data of one or multiple Broadcast session(s) are sent.

**MBS QoS Flow**: The finest granularity for QoS forwarding treatment for MBS data. Providing different QoS forwarding treatment requires separate MBS QoS Flows in 5GS supporting MBS.

**MBS Service Announcement:** Mechanism to allow users to be informed about the available MBS services.

**MBS session:** A multicast session or a broadcast session.

**Multicast communication service:** A 5GS communication service in which the same service and the same specific content data are provided simultaneously to a dedicated set of UEs (i.e., not all UEs in the multicast coverage are authorized to receive the data).

NOTE 2: For multicast communication service, the content provider and network can be aware whether the authorized UEs are actually receiving the data being delivered.

**Multicast MBS session:** An MBS session to deliver the multicast communication service. A multicast MBS session is characterised by the content to send, by the list of UEs that may receive the service and optionally by a multicast area where to distribute it.

**MBS service area:** The area within which data of one Multicast or Broadcast MBS session may be sent. For location dependent MBS, the MBS service area is uniquely identified by the combination of Area Session ID and MBS Session ID and corresponds to the location dependent content data of the MBS Session ID.

\* \* \* \* Second change \* \* \* \*

6.2 Local MBS service and Location dependent MBS service

### 6.2.1 General

Local MBS service is an MBS service provided in one MBS service area. A location dependent MBS service is an MBS service provided in several MBS service area(s). An MBS service area is identified by a cell list or a tracking area list. The MBS service area could be geographical area information or civic address information, and NEF/MBSF translates the location information to Cell ID list or TAI list as MBS service area, see clause 7.1.1.1.

### 6.2.2 Local MBS service

For a local MBS service, only UEs within the MBS service area may receive content data, while UEs outside the MBS service area are not allowed to receive location specific content. For multicast MBS service, UEs outside the MBS service area are not allowed to join the MBS service, and the network shall not deliver location specific content anymore to the UEs moved out of the MBS service area. The UE shall be able to obtain service area information of the local multicast service via MBS service announcement or via NAS signalling (UE Session Join Accept/Reject including Cell ID list or TAI list). If the UE Session Join procedure fails due to the UE being outside the MBS service area, the UE does not attempt to join the multicast session again until the UE moves inside the MBS service area. When the UE Session Join succeeds and if the multicast session is deactivated, the UE does not perform monitoring the session activation notification and any other information related to the multicast session identified by an MBS Session ID over the radio if outside the MBS service area.

NOTE X: Broadcast communication service is the service provided simultaneously to all UEs in a geographical area, therefore for broadcast it is naturally a local MBS service.

### 6.2.3 Location dependent MBS service

A location dependent MBS is identified by MBS Session ID, and provided in several MBS service areas. The location dependent MBS service enables distribution of different content data to different MBS service areas. The same MBS Session ID is used but a different Area Session ID is used for each MBS service area. The Area Session ID is used, in combination with MBS Session ID, to uniquely identify the service area specific part of the content data of the MBS service within 5GS. The network supports the location-dependent content distribution for the location dependent MBS services, while UEs are only aware of the MBS Session ID (i.e. UEs are not required to be aware of the Area Session IDs). When UE moves to a new MBS service area, content data from the new MBS service area shall be delivered to the UE, and the network ceases to deliver the content data from the old MBS service areas to the UE. When UE moves out of an MBS service area and there is no other MBS service area for thee MBS session, the network ceases to deliver the content data to the UE.

Information about different MBS service areas for a location dependent MBS service may be provided by one or several AFs or may be configured. Different ingress points for location dependent points for the MBS session are supported for different MBS service area dependent content of the MBS session; different MB-SMFs and/or MB-UPF may be assigned for different MBS service areas in an MBS session. When the different MB-SMFs are assigned for different MBS service areas in an MBS session, the same TMGI is allocated for this MBS session.

The Area Session ID is allocated by MB-SMF in MBS Session configuration procedure. MB-SMF allocates Area Session ID for each MBS services area which is unique within the MBS session. MB-SMF needs to further ensure there is no MBS service area overlapping with other MBS service areas that share the same MBS session ID.

### 6.2.4 Update of broadcast local MBS service and location dependent MBS service

If an MBS service area is updated via configuration for broadcast communication, the MB-SMF provides the updated MBS service area to AMFs, and the AMFs provide it to NG-RAN node(s) affected by the previous or updated service area. The RAN nodes terminate transmission of MBS data towards cells that were in the previous service area but are outside the new service area. The NG-RAN nodes start transmission of MBS data towards cells that were outside the previous service area but are inside the new service area.

### 6.2.5 Update of multicast local MBS service and location dependent MBS service

If an MBS service area is updated via configuration for multicast communication, the MB-SMF provides the updated MBS service area to:

- SMFs,

- and AMF(s), and the AMF(s) forward this information to the relevant NG-RAN(s) that update the MBS service area.

NG-RAN node configures the UE not to receive the MBS data over air interface if it detects the UE was in the previous service area but is outside the updated MBS service area NG-RAN node may release the tunnel for the shared delivery if none of the cells/TAs of the NG-RAN node belongs to the MBS service area any more. NG-RAN node configures the UE to receive the MBS data over air interface if it detects the UE was outside the previous service area but is inside the updated MBS service area, if part of cells/TAs of the NG-RAN node belongs to MBS service area and others outside the MBS service area.

For multicast communication, local MBS and location dependent MBS services may be supported via 5GC Individual MBS traffic delivery towards RAN nodes not supporting MBS. If the SMF obtains a notification about the UE location, it checks whether the UE is still in the MBS service area of the multicast session. For a local MBS service, if the UE is no longer in the MBS service area, the SMF terminates the 5GC Individual MBS traffic delivery towards the UE. For a location dependent MBS service, if the UE is no longer in the current MBS service area, the SMF determines whether the UE is in another MBS service area of the multicast session; if so, the SMF configures the UPF to send multicast data relating to the new MBS service area towards the UE. If the SMF terminates the 5GC Individual MBS traffic delivery towards the UE, it unsubscribes at the AMF from the notifications about the UE location or "UE moving in or out of a subscribed "Area Of Interest" event using the Namf\_EventExposure service.

\* \* \* \* Third change \* \* \* \*

7.2.4.2 Support of multicast service with location-dependent content

7.2.4.2.1 UE join location dependent multicast session and establishment procedure

The local multicast session join and establishment procedure is performed as defined in clause 7.2.1 with the following additions:

- The local multicast session is configured as described in clause 7.2.4.2.2.

- If SMF has no information about the multicast MBS session context for the indicated MBS Session ID, the SMF requests MB-SMF information via Nnrf\_NFDiscovery\_Request Request (MBS Session ID, UE location), the NRF provides information about the MB-SMF(s) serving the multicast session at the indicated location and service areas and service area IDs for the multicast session, via Nnrf\_NFDiscovery\_Request Response (MB-SMF profile(Area Session ID(s), MBS service area(s)). The SMF selects the MB-SMF based on the location area where the UE is residing and interacts with MB-SMF to retrieve QoS information of the multicast QoS flow(s) for the MBS Session ID,.

- SMF requests the AMF to transfer an N2 message to the RAN node using the Nsmf\_PDUSession\_UpdateSMContext response, to provide the NG-RAN with multicast session information which additionally includes the Area Session ID(s) and MBS service area(s) that the NG-RAN node belongs to. The SMF provides all MBS service areas information (Area session ID, MBS service area) to NG-RAN.

- The RAN uses the received MBS Session ID(s) and Area Session ID(s) to determine the local multicast session context and whether the user plane for the local multicast session is already established.

7.2.4.2.2 Configuration for local MBS

For local MBS, the configuration procedure for the UE is optional and performed as defined in clause 7.1.1.1 with the following additions:

- Multiple AFs may start the same multicast session with different content in different MBS service areas. The NEF selects MB-SMF as ingress control node(s) for different MBS service areas.

- If presented, the NEF maps possible external identifiers for MBS service areas to network-internal identifiers (e.g. list of cells, TAIs).

- MB-SMF allocates Area Session ID, and updates its NF profile towards the NRF with the MBS Session ID, session area and Area Session ID.

NOTE: For a location dependent service provided in different MBS service areas within the same SMF service area, it is assumed that one MB-SMF is used for an MBS Session. If the MBS Session ID is TMGI, the MB-SMF updating NF profile can be skipped.

- The policy of Multicast session is determined based on the service requirements per MBS service area.

- The MB-SMF may select the MB-UPF based on the MBS service area.

- The MBS service area(s) are indicated to the UE in the Service Announcement as defined in clause 6.11.

7.2.4.2.3 Handover procedure

The Handover procedure for the UE is performed as defined in clause 7.2.3 with the following additions:

- Before the Handover, The UE is camping at Source RAN and receiving multicast data corresponding to the MBS Session ID and Area Session ID.

- For the Xn Handover:

- Source RAN includes MBS Session ID, Area Session ID and MBS service area to the Target RAN.

- Target RAN determines whether to establish the resources for multicast distribution for MBS Session ID and Area Session ID provided by Source RAN, based on MBS Session ID, Area Session ID and MBS service area. NOTE: Data forwarding issue needs the feedback of RAN WGs

- Target RAN responses to Source RAN, with the accepted MBS Session ID, Area Session ID. When Target RAN supports multicast but the UE is no longer in the location area, Target RAN rejects to handover the multicast session with a cause indication.

- For the N2 Handover:

- The SMF includes all MBS session area information (MBS Session ID, Area Session ID and MBS service area) to the Target RAN in Handover request.

- Target RAN determines whether to establish the resources for multicast distribution for MBS Session ID and Area Session ID provided by SMF, based on MBS Session ID, Area Session ID and location area.

- Target RAN responses to SMF, with the accepted MBS Session ID and Area Session ID. When Target RAN supports multicast but the UE is no longer in the location area, Target RAN rejects to handover the multicast session with a cause indication.

- If the target RAN determines the shared delivery is not established for the multicast session ID and area session ID, the target NG-RAN initiates the shared delivery establishment as specified in clause 7.2.1.4.

\* \* \* \*Fourth change \* \* \* \*

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |

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