**3GPP TSG-SA2 Meeting # 150E** **(e-meeting) *S2-2202537***

**Elbonia, April 6 – 12, 2022**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **23.247** | **CR** | **0108** | **rev** | **-** | **Current version:** | **17.2.0** |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network | **X** |

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| ***Title:*** | Left issue on local MBS service | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei, HiSilicon | | | | | | | | | |
| ***Source to TSG:*** | SA2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | 5MBS | | | | |  | ***Date:*** | | | 2022-03-29 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | F |  | | | | | ***Release:*** | | | Rel-17 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
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| ***Reason for change:*** | | To align with RAN3 progress, i.e. data forwarding is supported, add the data forwarding mechanism description for local multicast service. | | | | | | | | |
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| Summary of change: | | Add the data forwarding description in local multicast service. | | | | | | | | |
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| ***Consequences if not approved:*** | | 1. Data forwarding is missed in the local multicast service. | | | | | | | | |
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| ***Clauses affected:*** | | 7.2.4.2.3, 7.2.4.3.3 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **x** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

\* \* \* \* 1st change \* \* \* \*

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. For multicast MBS service, UEs outside all MBS service areas of the location dependent MBS session are not allowed to join the MBS service. When UE moves out of an MBS service area and there is no other MBS service area for the MBS session, the network ceases to deliver the content data to the UE. Depending on policy, for the multicast MBS service the network may remove UEs outside all MBS service areas of the location dependent MBS Session from the multicast MBS session context after a grace period The SMF may subscribe at the AMF to notifications about UE moving in or out of all MBS service areas of the location dependent MBS session.

For multicast communication towards an NG-RAN supporting MBS, the NG-RAN node handles mobility of UEs within the MBS session between MBS service areas served by the same NG-RAN without interaction with SMF.

For multicast communication, location dependent MBS services may be supported via 5GC Individual MBS traffic delivery towards RAN nodes not supporting MBS. If the SMF determines that the UE is in another MBS service area of the multicast session, the SMF configures the UPF to send multicast data relating to the new MBS service area towards 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 creation 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.

NOTE 1: In this release, deployments topologies with specific SMF Service Areas are not supported, as a result, location dependent service using multicast communication is not supported when a UE moves outside its SMF service area.

NOTE 2: For 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.

NOTE 3: An example of Location-dependent MBS is a nationwide weather forecast service with local weather reports.

NOTE 4: Area Session ID is equivalent to Flow ID as specified in TS 23.246 [8].

\* \* \* \* Next change \* \* \* \*

7.2.4.2.0 Creation for location-dependent MBS session

For location-dependent MBS, the MBS session creation procedure is performed as defined in clause 7.1.1.2 with the following additions:

- Multiple AFs may start the same multicast session with different content in different MBS service areas. The AF (or NEF/MBSF if involved) selects MB-SMF for different MBS service areas.

- For each MBS service area, the AF creates a location dependent component of an MBS session for that service area towards the MB-SMF and provides the service area, which may be via NEF or MBSF. The MB-SMF additionally returns the Area Session ID allocated by MB-SMF in the response to a request to create a location-dependent component of a multicast session, and the NEF forwards this Area Session ID to the AF. The AF provides the Area Session ID in subsequent requests related to that location dependent component of the MBS session.

- When requesting the creation of a location dependent component of the MBS session for a service area, the AF provides an indication that the request is for the creation of a location dependent component of the MBS session.

- The NEF, if involved in the MBS Session, maps MBS service areas of external format (if any) to network internal format (list of cells, TAIs).

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

- The QoS of Multicast session is determined based on the service requirements per MBS Session. MB-SMF assign the same QFI for MBS QoS Flow with the same QoS requirement in different MBS service areas.

- The MB-SMF configures the MB-UPF separately for each service area. The MB-SMF may select the MB-UPF based on the MBS service area.

- All MBS service area(s) of the location dependent MBS session are indicated to the UE in the Service Announcement as defined in clause 6.11.

\* \* \* \* Next change \* \* \* \*

7.2.4.2.3 Handover procedure

Editor's note: The RAN specific behaviour in this clause requires RAN collaboration and confirmation.

The Handover procedure for the UE is performed as defined in clause 7.2.3.2, 7.2.3.3, and 7.2.3.4 with the following additions:

- If the UE is camping at Source RAN and receiving multicast data corresponding to the MBS Session ID and Area Session ID via the 5GC Shared MBS traffic delivery before the handover, for the Xn Handover (comparing with the clause 7.2.3.2), the following applies:

- The Source RAN node includes MBS Session ID, Area Session ID and MBS service area associated with the cell where the UE resides to the Target RAN node.

NOTE 1: During the handover procedure the associated QoS flow is established towards a NG RAN node not supporting MBS regardless whether the UE is still in the MBS service area associated with the original area session ID or not

- If the UE is camping at Source RAN and receiving multicast data corresponding to the MBS Session ID and Area Session ID via the 5GC Shared MBS traffic delivery before the handover, for the N2 Handover (comparing with the clause 7.2.3.3), the following applies:

- The source RAN node includes MBS session area information (MBS Session ID, Area Session ID and MBS service area associated with the cell where the UE resides) to the Target RAN node in Handover Required message.

- The SMF forwards the RAN container information and may also include MBS session area information (MBS Session ID, Area Session ID and MBS service area) to the Target RAN in Handover request.

NOTE 2: The SMF cannot determine the UE location and a possible new service area at this stage.

- If the UE is camping at Source RAN and receiving multicast data corresponding to the MBS Session ID and Area Session ID via the 5GC Individual MBS traffic delivery before the Handover, for the Xn/N2 handover procedure (comparing with the clause 7.2.3.4), the following applies:

NOTE 3: During the Xn handover procedure, the associated QoS flow is established at Target RAN side regardless whether the UE is still in the MBS service area associated with the original area session ID or not.

- For the N2 handover procedure, the SMF includes MBS session area information (MBS Session ID, Area Session ID, and MBS service area) associated with the last known service area of the UE in N2 SM information to the Target RAN node in Handover Request message.

- If the target RAN node support MBS, it determines whether to establish the resources for multicast distribution and data forwarding for the received MBS Session ID and Area Session ID, based on MBS Session ID, Area Session ID, MBS service area provided by the source RAN (if source RAN support MBS) or SMF (if source RAN not support MBS) and the target location of the UE. If UE is not in the MBS service area provided by the source RAN (if source RAN supports MBS) or SMF (if source RAN does not support MBS), the target RAN does not allocate RAN resources for the multicast MBS Session to the UE.

- If the target RAN node support MBS, when it 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 and provides the Area Session ID and tracking area ID(s) concerning the RAN node in addition to MBS Session ID in the request for shared delivery establishment. The MB-SMF provides MBS session area information (Area session ID(s), MBS service area(s)) associated with the MBS session to the NG-RAN in the shared delivery establishment reply. The MB-SMF may either provide only the service areas concerning the target RAN node or all service areas associated with the MBS session.

NOTE 4: If the target RAN does not support MBS, the associated QoS flow is established at target RAN side during the handover procedure regardless whether the UE is still in the MBS service area associated with the original area session ID or not.

- If the target RAN supports MBS, but the Source RAN does not support MBS, the SMF configures the UPF to stop sending data related to the multicast session and service area via the associated PDU session of the UE. The SMF unsubscribes at the AMF using the Namf\_EventExposure service to notifications about UE location changes, or to notifications about the "UE moving in or out of a subscribed "Area Of Interest"" event (for an individual service area).

NOTE 5: If the UE is still in the MBS session, the subscription for the UE entering or leaving the complete service area does not need to be changed.

- When the AMF receives the User Location Information from target RAN node via the Path Switch Request message or Handover Notify message, the AMF provide it to the SMF. When the SMF get the User Location Information, the SMF determines the MBS service area of the UE camping cell by comparing the User Location Information received from AMF with the MBS service areas received from the NRF. The SMF uses the determined MBS service area and determined user location as follows:

- The SMF updates the area session ID in the locally stored the UE MBS session context with the corresponding area session ID if the area session ID is changed.

- If the target RAN does not support MBS, the Source RAN supported MBS, and the UE is in a service area of the MBS session, the SMF applies individual delivery towards the UE. The SMF configures the UPF to send data related to the multicast session and service area via the associated PDU session of the UE. The SMF additionally subscribes at the AMF using the Namf\_EventExposure service to notifications about UE location changes, or to notifications about the "UE moving in or out of a subscribed "Area Of Interest"" event. In the latter case the SMF supplies the service area of the multicast area session as Area Of Interest. If associated QoS flows are not yet included in the PDU session, the SMF updates the PDU session with associated QoS flows.

- If the UE has moved to another MBS service area of the MBS session:

- If the target NG-RAN node support MBS and RAN resource has not been allocated, the SMF provides the MBS session information related to the new Area session ID to NG-RAN. For Xn handover, the SMF updates the PDU session with the N2 SM information using the Path Switch Request Ack message. For N2 handover, the SMF updates the PDU session after the completion of the handover procedure. Per the received the MBS session information, the 5GC shared delivery is established.

- If the target NG-RAN node does not support MBS, the SMF updates the UPF to forward the MBS data packet from the tunnel associated with the old Area session ID to the new Area session ID. If the SMF did not configure the UPF to receive the MBS data packet from the tunnel associated with the new Area session ID before, the SMF informs the MB-SMF of the new Area session ID and UPF DL N19mb Tunnel information. MB-SMF configure the MB-UPF to transmit the multicast session data towards UPF using the received downlink tunnel ID. If the SMF subscribed to the "Area Of Interest" event, the SMF also updates the subscription with the new service area as "Area Of Interest".

- If the UE has moved out of all the MBS service areas of the MBS session:

- If the target NG-RAN node does not support MBS, the SMF deletes the associated QoS flow from NG-RAN and UPF after the completion of the handover.

- Per operator's policy (e.g. when a local configured timer expires since the UE left the whole MBS service area), the SMF may remove the UE from the MBS session as defined in clause 7.2.2.3. When the UE is removed from the location dependent MBS session, the SMF also unsubscribes to the AMF from the notifications about the "UE moving in or out of a subscribed "Area Of Interest"" event.

\* \* \* \* Next change \* \* \* \*

7.2.4.3.3 Handover procedure with local MBS session

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

- If the UE is camping at the Source RAN node and receiving multicast data corresponding to the MBS Session ID via the 5GC Shared MBS traffic delivery before the Handover, for Xn based handover in clause 7.2.3.2, the Source RAN node includes MBS Session ID and MBS service area to the Target RAN node during Handover Preparation phase. For N2 based handover in clause 7.2.3.3, this step corresponds to Handover Request and Handover Required message, respectively.

NOTE: During the Xn or N2 handover procedures, if the target RAN node does not support MBS, the associated QoS flow is established at the Target RAN side regardless whether the UE is still in the MBS service area.

- If the UE is camping at the Source RAN node and receiving multicast data corresponding to the MBS Session ID via the 5GC individual MBS traffic delivery before the Handover, for the N2 Handover in clause 7.2.3.4, the SMF includes MBS session area information (MBS Session ID and MBS service area) in N2 SM information to the Target RAN node in Handover request.

- If the Target RAN node support MBS, it determines whether to establish the resources for multicast distribution and data forwarding for MBS Session ID, based on the received MBS Session ID provided by the source RAN (if source RAN support MBS) or SMF (if source RAN not support MBS), and target location of the UE. If UE is not in the in the MBS service area provided by the source RAN (if source RAN support MBS) or SMF (if source RAN not support MBS), the Target RAN does not allocate RAN resources for the multicast MBS Session to the UE.

- If the target RAN node support MBS, when it determines that the UE is in the MBS service area and that the shared delivery is not established for the multicast session ID, the target NG-RAN initiates the shared delivery establishment as specified in clause 7.2.1.4.

- When the AMF receives the User Location Information from target RAN node via the Path Switch Request message or Handover Notify message, the AMF provide it to the SMF. When the SMF get the User Location Information, the SMF check the MBS service area of UE camping cell by comparing the User Location Information received from AMF with the MBS service area received from the MB-SMF. The SMF uses the determined UE location and MBS service area as follows:

- The SMF determines whether the UE is outside the MBS service area by comparing the received Cell ID and tracking area ID with the MBS service area received from the MB-SMF.

- If the UE is inside the MBS service area and target RAN node does not support MBS, the SMF applies individual delivery towards the UE. If associated QoS flows are not yet included in the PDU session, the SMF updates the PDU session with associated QoS flows. If the SMF did not configure the UPF to receive the MBS data packet from the tunnel associated with the multicast session before, the SMF informs the MB-SMF of the MBS session and UPF DL N19mb Tunnel information. MB-SMF configure the MB-UPF to transmit the multicast session data towards UPF using the received downlink tunnel ID.

- If the UE is out of the service area of the MBS session:

- If the target NG-RAN node does not support MBS, the SMF deletes the associated QoS flow from NG-RAN node and the UPF.

- Per operator's policy (e.g. when a local configured timer expires since the UE left the whole MBS service area of the MBS session) the SMF may remove the UE from the MBS session as defined in clause 7.2.2.3. When the UE is removed from the local MBS session, the SMF also unsubscribes to the AMF from the notifications about the "UE moving in or out of a subscribed "Area Of Interest"" event.

\* \* \* \* End of change \* \* \* \*