**SA WG2 Meeting #139E S2-2004503**

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**Source: Nokia, Nokia Shanghai Bell**

**Title:** KI #6, new Solution Global Unicast Group ID for local Unicast Contents

**Document for: Approval**

**Agenda Item: 8.9**

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

*Abstract of the contribution:*

# 1 Discussion

KI 6 is defined as follows:

***5.6 Key Issue #6: Local MBS service***

***5.6.1 Description***

*For V2X, Public Safety and other service provided locally, there may be a multicast or broadcast communication services only available in a local service area (e.g., per cell, TA or other geographic metric) and for a specific time (e.g., during event hours, emergency situation, or operation hours).*

*In this situation, it is also expected that different application servers can be assigned to control the multicast or broadcast communication service(s) in each service area. UEs may need to be configured to receive information about available multicast or broadcast service in the area where they are residing.*

*Therefore, for supporting local multicast and broadcast communication services, the following aspects will be studied:*

*- Whether additional specific functionality and information (e.g. geographical range for broadcast service area/multicast service area) is required to provide local multicast and broadcast communication services in 5G system in a resource efficient manner, and if so, how.*

*- How to support UEs if necessary, to discover and receive multicast and broadcast communication services which is available locally in 5G system in a resource efficient manner*

To address the key issue it may be desirable to avoid changing multicast session Ids depending on UE location for services with different content depending on UE location, e.g. for V2X. Otherwise constant updates of the UEs and complex detection procedures or configuration with location dependent multiplex session IDs are required.

**Proposal 1. For local MBS services it shall be possible to assign a single multicast session ID, but provide different contents depending on the location area.**

Content provisioning in proximity to the location area where the content is to be distributed seems desirable to reduce transport delay, that is critical in particular for V2X applications.

**Proposal 2. For local MBS services it shall be possible to assign different ingress nodes for different content, depending on the location area where the content is to be distributed.**

# 2 Conclusions

It is proposed to update TR 23.757 as per the proposals made in the discussion section. The proposed changes are shown below.

**Proposed changes to TR 23.757**

## 6.0 Mapping of solutions to key issues

Editor's note: This clause describes the mapping between solutions and key issues.

Table 6.0-1: Mapping of solutions to key issues

|  |  |
| --- | --- |
|  | Key Issues |
| Solutions | 1MBS session management | 2Service levels definition | 3Levels of authorization for MC | 4QoS for MC and BC | 5BC TV and Radio services | 6Local MBS | 7MC-UC delivery mode switch | 8BC-UC delivery method switch | 9IWK with EPC/eMBMS for Public Safety |
| 1 |  | x |  |  |  |  |  |  |  |
| 2 | x |  |  |  |  |  |  |  |  |
| 3 | x |  |  |  |  |  |  |  |  |
| 4 | x |  |  |  |  |  |  |  |  |
| 5 | x |  |  |  |  |  |  |  |  |
| 6 | x |  |  |  |  |  |  |  |  |
| 7 |  |  |  |  |  | x |  |  |  |
| X |  |  |  |  |  | X |  |  |  |

## 6.X Solution #X: Global Unicast Group ID for local Unicast Contents

### 6.X.1 Functional Description

#### 6.X.1.1 System Architecture

This solution addresses Key Issue 6. The architecture functional entities are described in Annex A.1 "5G MBS system architecture based on unicast 5GC". Solution 3 is extended to address specific requirements of local MBMS services.

#### 6.X.1.2 Specific additions to solution 3 for local MBMS services

It is desirable to avoid changing multicast session IDs depending on UE location for services with different content depending on UE location, e.g. for V2X. Otherwise constant updates of the UEs and complex detection procedures or configuration with location dependent multiplex session IDs are required.

**A single multicast Session ID is assigned for a multicast group, but the contents distributed as part of the multicast group differ depending on the location area where the UE is residing.**

**Only the multicast Session ID is announced to the UE and the network selects the related contents depending on the UEs´s location.**

Content provisioning in proximity to the location area where the content is to be distributed seems desirable to reduce transport delay, that is critical in particular for V2X applications.

**It is possible to assign different ingress nodes for different location area dependent content for a multicast group.**

To achieve those aims, the multicast group context in the UDR is extended with location area dependent information:

* A description of the location are, e.g. list of cells, TAIs.
* A network-internal local area ID assigned to the location area that is unique for the multicast session.
* An ingress node assigned to the location area.
* Possibly a multicast transport address assigned to the location area.

An AF may register at the NEF that it provides contents for a multicast group for a specific location area. The NEF then selects an ingress node for the multicast group in the specific location area and a local area identifier is assigned. The information is stored in the UDR.

Alternatively, the UDR can contain configured information based on commercial agreements with the content provider.

An SMF can provide a UE location to the UDR to query for location dependent information within a multicast session context.

The SMF serving a UE provides information about the access to content for the multicast session in the location area towards the RAN. The RAN contacts the related ingress node to join the location area dependent distribution tree for the multicast content

The AMF notifies the SMF when the UE leaves the location area. The SMF obtains multicast context information for the new UE location from the UDR and then provides information about the access to content for the multicast session in the new location area towards the RAN.

### 6.X.2 Procedures

#### 6.X.2.1 Multicast context and Multicast flow setup/modification via PDU Session Modification procedure

The flow is the same as described in subclause 6.3.2.1, with the differences highlighted in the description of the steps.

Editor’s Note: The multicast group join procedure need align with the general multicast group join procedure defined in clause 6.3.2.1, e.g. step 6-17.



Figure 6.X.2-1: PDU Session modification for multicast

1. The content provider may send a request to register and reserve resources for a multicast group in a specific location area to the NEF as detailed in subclause 6.X.2.2. The NEF select SMF2 as ingress node for the location area and stores related information in the UDR

NOTE 1: The request to reserve resources for the corresponding multicast session is optional and can be replaced by configured data based on commercial agreements.

2. Same as in subclause 6.3.2.1

3. Same as in subclause 6.3.2.1. No information about the local content is announced

4. Same as in subclause 6.3.2.1

5. Same as in subclause 6.3.2.1

6. The SMF1 queries the UDR for information about the multicast context. If the UDR provides information about location areas stored within the multicast context (including SMF2 ID, location are and area session ID for each location area), the SMF1 selects location dependent multicast context information based on the location area where the UE is residing. The SMF determines the applicable SMF2 ID, area session ID, location area in that manner.

7. The SMF requests the AMF to transfer a message to the RAN node using the Namf\_N1N2MessageTransfer service (N2 SM information (PDU Session ID, Multicast group ID, SMF2 ID, **location area, area session ID**),

8. The RAN is using the received multicast Multicast group ID and **area session ID** to determine the localized multicast distribution context.

9. Same as in subclause 6.3.2.1.

10. RAN node checks whether the user plane for the multicast group/context and location area distribution is already established towards the RAN node.

If no user plane for multicast group distribution is established towards the RAN node, steps 11 to 15 are executed

11. RAN signals a request for the user plane establishment towards that AMF [SMF2 ID, Multicast group ID, **area session ID]**.

12. Same as in subclause 6.3.2.1. SMF2 identifies media distribution session based on Multicast group ID and **area session ID**

13-21: Same as in subclause 6.3.2.1.

#### 6.X.2.2 Optional Multicast group registration



Figure 6.X.2.2-1: Optional Multicast group registration

1: AF of content provider may register at the NEF that it provides contents for a multicast session (identified by multicast group ID which may be IP multicast address) **for a certain location area (e.g. list of cells, TAIs, geographical area). (Multiple AFs may register for the same mulicast session but different location areas.)** NEF selects SMF2 as ingress control node, possibly based on location area.

2-3: NEF requests storage of multicast session at UDR and provides multicast session ID, selected SMF2 ID **and location area**. The **UDR allocates an area session ID** for the location area and stores all these data.

4: NEF request SMF2 to reserve ingress resources for a multicast distribution session and provides Multicast session ID and **area session ID**

5-7: Same as in subclause 6.3.2.2.

### 6.X.3 Impacts on services, entities and interfaces

Same as in subclause 6.3.3. Location area Identifier needs to be stored and signalled in addition.