**SA WG2 Meeting #S2-162 S2-2404377r02**

**15 - 19 April, 2024, Changsha, China (revision of S2-2402589)**

**Source: ZTE, Tencent, Tencent Cloud, NEC**

**Title: KI#1, new solution on the connected mobility between 4G CSG and 5G CAG**

**Document for: Approval**

**Agenda Item: 19.12**

**Work Item / Release: FS\_5G\_Femto / Rel-19**

*Abstract of the contribution: This paper proposes a new solution to key issue#1 on the 4G CSG and 5G CAG interworking*

# 1. Proposal

It is proposed to accept the changes to TR 23.700-45.

>>>> Start of Change <<<<

6.0 Mapping of Solutions to Key Issues

**Table 6.0-1: Mapping of Solutions to Key Issues**

|  |  |  |
| --- | --- | --- |
|  | **Key Issues** | |
| **Solutions** | **<Key Issue #1>** | **<Key Issue #2>** |
| **#1** |  |  |
| **#2** |  |  |
| **#3** |  |  |
| **#4** |  |  |
| **#X** | x |  |

>>>> Next Change <<<<

6.X Solution #X: The connected mode mobility between 4G CSG cell and 5G CAG cell

6.X.1 Description

This solution is to address the connected mode mobility part of KI#1 and propose enhancements to support the UE connected mode mobility between CAG cell of 5G and CSG cell of 4G.

The high level principle/assumption of this solution can be summarized as follows:

- The 4G and 5G interworking architecture with N26 interface defined in the 23.501 [2] clause 4.3.1 is applied.

- There is UE’s allowed 4G CSG list and 5G CAG list subscription in the UDM/HSS.

- The UDM/HSS can provide the UE allowed 4G CSG list and 5G CAG list to AMF. The AMF creates the Mobility restriction list (including allowed CAG and CSG list) accordingly and send it to NG-RAN.

NOTE: How UDM/HSS provides the allowed 5G CAG list to AMF can refer to solutions to KI#2.

- The NG-RAN is pre-configured with the CSG information (CSG ID and Cell Access Mode) of neighbouring 4G CSG cell which can be done by OAM.

- According to the UE measurement report, the pre-configured CSG information of neighbouring 4G CSG cell and allowed CSG list in the Mobility restriction list, the NG-RAN determines the target 4G CSG cell and initiates the 5GS to EPS HO procedure.

- There is no change to EPS side

NOTE: For the EPS to 5GS HO, the normal 4G to 5G Handover is performed. After the handover, the UE perform the registration, the AMF perform the CAG Access control as per TS 23.501 [2].

6.X.2 Procedures

#### 6.X.3.1 HO from 5GS to EPS

The clause 4.2.2.2.2 of TS 23.502 [3] (General Registration) is re-used with following additional handling.

- In the step 14b, the UDM provides the UE allowed 4G CSG list and 5G CAG list to AMF.

- In step 21, the AMF providers the Mobility restriction list (including allowed CAG and CSG list) to NG-RAN.



Figure 6.x.3.1-1: 5GS to EPS handover

The clause 4.11.1.2.1 of TS 23.502 [3] (5GS to EPS handover using N26 interface) is re-used with following additional handling.

- The NG-RAN is pre-configured with the CSG information of neighbouring 4G CSG cell

- In step 1, the NG-RAN determines the target CSG cell for handover, and send the CSG ID and Access Mode of target cell to AMF in the Handover required message.

- In step 3, the AMF check the UE’s CSG subscription and sets proper CSG membership indication as part of the Forward Relocation Request message towards MME.

#### 6.X.3.2 HO from EPS to 5GS

The procedure is same with clause 4.11.1.2.2 of TS 23.502 [3]. There is no enhancement for this procedure. In the existing mechanism:

- In step 10 in clause 4.11.1.2.2.2 (Preparation phase), the NG-RAN has provided supported CAG List of target cell in the Handover Request ACK to the AMF as per 38.413 [x] clause 9.2.3.5.

- In step 12 in clause 4.11.1.2.2.3 (Execution phase), the UE performs the EPS to 5GS Mobility Registration Procedure. AMF shall verify whether the UE is allowed to access to the CAG cell according to the allowed CAG list from UDM and supported CAG List from NG-RAN.

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

**UDM:**

- There is UE allowed 4G CSG list and 5G CAG list subscription in the UDM/HSS.

- The UDM provides the allowed 4G CSG list and 5G CAG list as subscription data to AMF.

**AMF:**

- It creates the Mobility restriction list according to allowed CAG and CSG list received from UDM, and send it to NG-RAN.

- Support formulation of membership indication towards MME during 5GS to EPS handover.

**NG-RAN:**

- To be pre-configured with the CSG information of neighbouring 4G CSG cell which can also be done by OAM.

- According to the allowed CSG list in the Mobility restriction list and the pre-configured CSG information of neighbouring 4G CSG cell, the NG-RAN determines the target CSG cell.

- In the HO required message, it indicate the target CSG cell id and Access Mode to the AMF.

>>>> End of Change <<<<