**3GPP TSG-SA3 Meeting #109AdHoc-e *draft\_S3-230106-r1***

**Electronic meeting, 16 - 20 January 2023**

**Source: ZTE**

**Title: Add editor's note to solution 5**

**Document for: Approval**

**Agenda Item: 5.6**

# 1 Decision/action requested

***This contribution proposes to add an editor’s note to solution 5 of the TR 33.737.***

# 2 References

[1] TR33.737 v0.4.0

# 3 Rationale

In the 6.1.2 section of the 33.501, the AUSF can only store the serving network name temporarily. Therefore, when the primary authentication is completed, the AUSF may not store the serving network name. In addition, if the AUSF is changed during the primary authentication, whether it is the same as the previous primary authentication service network cannot be determined.

It is proposed to add the editor’s note for the solution.

# 4 Detailed proposal

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## 6.5 Solution #5: AKMA anchor key registration to the AAnF in VPLMN after primary authentication

### 6.5.1 Introduction

This solution addresses the KI #1. The proposed solution supports registration of AKMA anchor key (KAKMA) and A-KID to the AAnF in VPLMN after primary authentication for UE in the same manner of KAKMA and A-KID registration to the AAnF in HPLMN. Once the KAKMA and the A-KID are registered in the AAnFs in VPLMN and HPLMN, the UE in VPLMN is able to access to both VPLMN AF and HPLMN AF. Moreover, even if KAUSF which is a root key of the KAKMA is changed by new primary authentication, there is no need additional key update procedure for the VPLMN AAnF since the new KAKMA and A-KID will replace the old keys whenever primary authentication is performed.

### 6.5.2 Solution details

#### 6.5.2.1 AKMA anchor key registration in roaming scenario



Figure 6.5.2.1-1: AKMA anchor key registration to the AAnF in VPLMN after primary authentication

1. The AUSF requests authentication information to the UDM to acquire subscription information and authentication method in primary authentication procedure.

2. The UDM responses with the Authentication Vector. The AKMA indication and the RID may be included in the response if the UE needs AKMA anchor key generation.

3. If the AUSF receives the AKAM indication from the UDM, the AUSF shall store SN-name, KAUSF and generate AKMA Anchor Key (KAKMA) and the A-KID. The UE shall generate the KAKMA and the A-KID if the primary authentication procedure is completed.

4. If the keys generation is completed, the AUSF shall request to the HPLMN AAnF to register A-KID and KAKMA. The selection of the AAnF is described in TS 33.535 clause 6.7 [2].

5. The AAnF in HPLMN responses to the AUSF after key registration completed.

6. If the AUSF recognizes the UE is from a roaming network based on SN-name which is received previously in the primary authentication procedure, the AUSF shall request to the VPLMN AAnF to register A-KID and KAKMA.

To selects the AAnF in VPLMN to register KAKMA and A-KID, local configuration or NRF can be utilized. When NRF is used to discover and select the AAnF in VPLMN, serving PLMN ID shall be used in the discovery and selection by NRF in different PLMNs.

7. The AAnF in VPLMN responses to the AUSF after key registration completed.

#### 6.5.2.2 UE in VPLMN accessing internal VPLMN AF



Figure 6.5.2.2-1: Application session establishment between roaming UE and AF in VPLMN

0. The UE is roaming in VPLMN and AKMA anchor key is registred in the AAnF in VPLMN after the procedure in clause 6.5.2.1.

1. When the UE initiates communication with the AF in VPLMN, it shall include the derived A-KID in the Application Session Establishment Request message.

2. The AF in VPLMN identifies based on the realm part from the received A-KID whether the UE is from other serving network. If the AF decides to support the UE from other serving network, the AF requests application key to the AAnF in VPLMN.

To selects the AAnF in VPLMN for the AF to provide the KAF, local configuration or NRF can be utilized. When NRF is used to discover and select the AAnF in VPLMN, both RID and home network identifier from the received A-KID are used to select the AAnF.

3. The AAnF in VPLMN derives the KAF from KAKMA if it does not already have KAF.

4. The AAnF in VPLMN sends Naanf\_AKMA\_ApplicationKey\_Get response to the AF in VPLMN with SUPI, KAF and the KAF expiration time.

5. The AF in VPLMN sends the Application Session Establishment Response to the UE.

NOTE: NFs in VPLMN could provide LI context (A-KID, KAKMA, KAF, etc.) when LI enabled.

#### 6.5.2.3 UE in VPLMN accessing internal HPLMN AF



Figure 6.5.2.3-1: Application session establishment between roaming UE and AF in HPLMN

0. The UE is roaming in VPLMN and AKMA anchor key is registred in the AAnF in HPLMN after the procedure in clause 6.5.2.1.

1. When the UE initiates communication with the AF in HPLMN, it shall include the derived A-KID in the Application Session Establishment Request message.

2. The AF in HPLMN requests application key to the AAnF in HPLMN.

3. The AAnF in HPLMN derives the KAF from KAKMA if it does not already have KAF.

4. The AAnF in HPLMN identifies based on the realm part from the received A-KID whether the UE is from other serving network. If the AF decides to support the UE from other serving network, the AF provides AKMA context to the AAnF in VPLMN to support LI.

To selects the AAnF in VPLMN for the AF to provide the KAF, local configuration or NRF can be utilized. When NRF is used to discover and select the AAnF in VPLMN, both RID and home network identifier from the received A-KID are used to select the AAnF.

5. The AAnF in VPLMN stores the delivered AKMA related information from HPLMN to support LI.

6. The AAnF in VPLMN responses to the AAnF in HPLMN.

7. The AAnF in HPLMN sends Naanf\_AKMA\_ApplicationKey\_Get response to the AF in VPLMN with SUPI, KAF and the KAF expiration time.

8. The AF in HPLMN sends the Application Session Establishment Response to the UE.

NOTE: NFs in VPLMN could provide LI context (A-KID, KAKMA, KAF, etc.) when LI enabled.

### 6.5.3 Evaluation

KAKMA in HPLMN is shared to VPLMN, and same KAKMA will be AKMA anchor key in HPLMN and VPLMN.

AUSF needs to store SN-name in primary authentication.

Editor’s Note: When same KAKMA is shared to VPLMN and HPLMN, how to make different the KAF in VPLMN and HPLMN is FFS.

Editor’s Note: How the AUSF discovers the AAnF in the VPLMN is FFS.

Editor’s Note: How the solution is aligned with clause 4 is FFS.

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