**3GPP TSG-SA3 Meeting #107-e *S3-220806***

**e-meeting, 16 - 20 May 2022**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **33.501** | **CR** | 1371 | **rev** |  | **Current version:** | **16.10.0** |  |
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| *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:*** | Include SN ID in NSSAA procedure | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei, HiSilicon | | | | | | | | | |
| ***Source to TSG:*** | S3 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | eNS, TEI16 | | | | |  | ***Date:*** | | | 2022-05-06 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-16 |
|  | *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:*** | | UEs can be registered at two different AMFs belonging to two different PLMNs for 3GPP access and non-3GPP access. It is also possible that UE can be served by two different AMFs belonging to same PLMN in the temporary situation when it is moved from EPC while the UE has PDU Sessions associated with non-3GPP access to 5GS.  The NSSAA procedure was developed initially for only one AMF serving a UE. The AAA-S triggered NSSAA re-authentication/revocation procedure was thus updated in TS23.502 (c.f. SP-210544) to take into account the two different AMF cases. However, the initial NSSAA has not been addressed and the messages exchanges with AAA-S are not updated. This will cause NSSAA not completed successfully otherwise.  **1) Problem at NSSAAF**: the NSSAAF needs to forward authentication messages from AAA-S to a correct AMF. These messages are currently only identified by S-NSSAI and GPSI. In a two-registration scenario however with two AMFs, the NSSAAF does not know to which AMF to forward. It is worth mentioning that the NSSAAF (interacting with AAA) transport EAP messages transparently and routing information is based on IE provided such as S-NSSAI and GPSI.  This CR resolves this limitation (i.e. by adding SN-ID in the NSSAA messages to and from AAA-S) | | | | | | | | |
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| ***Summary of change:*** | | Update NSSAA procedures to properly support the case where the UE is served by two different AMFs, by including serving SN ID information where necessary. | | | | | | | | |
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| ***Consequences if not approved:*** | | When the UE is served by two AMFs, overlapping NSSAA procedures might result in wrongly rejected or wrongly accepted NSSAA in one of the accesses. | | | | | | | | |
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| ***Clauses affected:*** | | 16.6.3 | | | | | | | | |
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|  | | **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:*** | |  | | | | | | | | |

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* Start of changes \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

## 16.3 Network slice specific authentication and authorization

This clause specifies the optional-to-use NSSAA between a UE and an AAA server (AAA-S) which may be owned by an external 3rd party enterprise. NSSAA uses a User ID and credentials, different from the 3GPP subscription credentials (e.g. SUPI and credentials used for PLMN access) and takes place after the primary authentication.

The EAP framework specified in RFC 3748 [27] shall be used for NSSAA between the UE and the AAA server. The SEAF/AMF shall perform the role of the EAP Authenticator and communicates with the AAA-S via the NSSAAF. The NSSAAF undertakes any AAA protocol interworking with the AAA-S. Multiple EAP methods are possible for NSSAA. If the AAA-S belongs to a third party the NSSAAF contacts the AAA-S via a AAA-P. The NSSAAF and the AAA-P may be co-located.

To protect privacy of the EAP ID used for the EAP based NSSAA, a privacy-protection capable EAP method is recommended, if privacy protection is required.

The steps involved in NSSAA are described below.



Figure 16.3-1: NSSAA procedure

1. For S-NSSAIs that are requiring NSSAA, based on change of subscription information, or triggered by the AAA-S, the AMF may trigger the start of the NSSAA procedure.

If NSSAA is triggered as a result of Registration procedure, the AMF may determine, based on UE Context in the AMF, that for some or all S-NSSAI(s) subject to NSSAA, the UE has already been authenticated following a Registration procedure on a first access. Depending on NSSAA result (e.g. success/failure) from the previous Registration, the AMF may decide, based on Network policies, to skip NSSAA for these S-NSSAIs during the Registration on a second access.

If the NSSAA procedure corresponds to a re-authentication and re-authorization procedure triggered as a result of AAA Server-triggered UE re-authentication and re-authorization for one or more S-NSSAIs, as described in clause 16.4, or triggered by the AMF based on operator policy or a subscription change and if S-NSSAIs that are requiring Network Slice-Specific Authentication and Authorization are included in the Allowed NSSAI for each Access Type, the AMF selects an Access Type to be used to perform the NSSAA procedure based on network policies.

2. The AMF may request the UE User ID for EAP authentication (EAP ID) for the S-NSSAI in a NAS MM Transport message including the S-NSSAI.

3. The UE provides the EAP ID for the S-NSSAI alongside the S-NSSAI in an NAS MM Transport message towards the AMF.

4. The AMF sends the EAP ID to the NSSAAF which provides interface with the AAA, in an Nnssaaf\_NSSAA\_Authenticate Request (EAP ID Response, GPSI, S-NSSAI, SN-ID).

5. If the AAA-P is present (e.g. because the AAA-S belongs to a third party and the operator deploys a proxy towards third parties), the NSSAAF forwards the EAP ID Response message to the AAA-P, otherwise the NSSAAF forwards the message directly to the AAA-S. NSSAAF routes to the AAA-S based on the S-NSSAI. The NSSAAF/AAA-P forwards the EAP Identity message to the AAA-S together with S-NSSAI, SN-ID and GPSI. The AAA-S stores the GPSI to create an association with the EAP ID in the EAP ID response message so the AAA-S can later use it to revoke authorisation or to trigger reauthentication. The AAA-S uses the EAP-ID, SN-ID and S-NSSAI to identify for which UE, PLMN, and slice authorisation is requested.

NOTE: If the AAA-S belongs to the 3rd party, the NSSAAF optionally maps the S-NSSAI to External Network Slice Inforamtion (ENSI), and forwards the EAP Identity message to the AAA-S together with ENSI, SN-ID, and GPSI. In this case, the AAA-S uses the EAP-ID, SN-ID and ENSI to identify for which UE, PLMN, and slice authorisation is requested.

6 -11. EAP-messages are exchanged with the UE. One or more than one iterations of these steps may occur.

12. EAP authentication completes. An EAP-Success/Failure message is delivered to the NSSAAF/AAA-P along with GPSI, SN-ID and S-NSSAI/ENSI.

13. The NSSAAF sends the Nnssaaf\_NSSAA\_Authenticate Response (EAP-Success/Failure, S-NSSAI, GPSI) to the AMF.

14. The AMF transmits a NAS MM Transport message (EAP-Success/Failure) to the UE.

15. Based on the result of Slice specific authentication (EAP-Success/Failure), if a new Allowed NSSAI or new Rejected NSSAIs needs to be delivered to the UE, or if the AMF re-allocation is required, the AMF initiates the UE Configuration Update procedure, for each Access Type, as described in clause 4.2.4.2 of TS 23.502 [8].

If the NSSAA procedure can not be completed (e.g. due to server error or UE becoming unreachable), the AMF sets the status of the corresponding S-NSSAI subject to Network Slice-Specific Authentication and Authorization in the UE context as defined in 3GPP TS 29.526 [96], so that an NSSAA is executed next time the UE requests to register with the S-NSSAI.

## 16.4 AAA Server triggered Network Slice-Specific Re-authentication and Re-authorization procedure

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Figure 16.4-1: AAA Server initiated Network Slice-Specific Re-authentication and Re-authorization procedure

0. The UE is registered in 5GC via an AMF. The AMF ID is stored in the UDM.

1. The AAA-S requests the re-authentication and re-authorization for the Network Slice specified by the S-NSSAI/ENSI and SN-ID in the Re-Auth Request message, for the UE identified by the GPSI in this message. This message is sent to an AAA-P, if the AAA-P is used (e.g. the AAA Server belongs to a third party), otherwise it may be sent directly to the NSSAAF. If an AAA-P is present, the AAA-P relays the Reauthentication Request to the NSSAAF.

2. The NSSAAF checks whether the AAA-S is authorized to request the re-authentication and re-authorization by checking the local configuration of AAA-S address per S-NSSAI. If successful, the NSSAAF requests UDM for the AMF serving the UE using the Nudm\_UECM\_Get (GPSI, SN-ID, AMF Registration) service operation. The UDM provides the NSSAAF with the AMF ID of the AMF serving the UE.

3. The NSSAAF provides an acknowledgement to the AAA protocol Re-Auth Request message. If the AMF is not registered in UDM the procedure is stopped here.

4. If the AMF is registered in UDM, the NSSAAF requests the relevant AMF to re-authenticate/re-authorize the S-NSSAI for the UE using the Nnssaaf\_NSSAA\_Re-authenticationNotification service operation. The AMF is implicitly subscribed to receive Nnssaaf\_NSSAA\_Re-authenticationNotification service operations. The NSSAAF may discover the Callback URI for the Nnssaaf\_NSSAA\_Re-authenticationNotification service operation exposed by the AMF via the NRF.

The AMF acknowledges the notification of Re-authentication request.

5. If the UE is registered with the S-NSSAI in the Mapping Of Allowed NSSAI, the AMF triggers the NSSAA procedure defined in clause 16.3 for the UE identified by the GPSI and the Network Slice identified by the S-NSSAI received from the NSSAAF.

If the UE is registered but the S-NSSAI is not in the Mapping Of Allowed NSSAI, the AMF removes any status of the corresponding S-NSSAI subject to Network Slice-Specific Authentication and Authorization in the UE context it may have kept, so that an NSSAA is executed next time the UE requests to register with the S-NSSAI.

## 16.5 AAA Server triggered Slice-Specific Authorization Revocation



Figure 16.5-1: AAA Server-initiated Network Slice-Specific Authorization Revocation procedure

0. The UE is registered in 5GC via an AMF. The AMF ID is stored in the UDM.

1. The slice specific AAA-S requests the revocation of authorization for the Network Slice identified by the GPSI accessed through SN identified by SN-ID in the AAA Protocol Revoke Authorization Request message. This message is sent to NSSAAF instance interfacing with AAA-S or AAA-P if it is used.

The AAA-P, if present, relays the request to the NSSAAF.

2. The NSSAAF checks whether the AAA-S is authorized to request the revocation by checking the local configuration of AAA-S address per S-NSSAI. If success,the NSSAAF requests UDM for the AMF serving the UE using the Nudm\_UECM\_Get (GPSI, SN-ID, AMF Registration) service operation. The UDM provides the NSSAAF with the AMF ID of the AMF serving the UE.

3. The NSSAAF sends an acknowledgement to the the AAA-S/AAA-P with AAA Protocol Revoke Authorization Response message. If the AMF is not registered in UDM the procedure is stopped here.

4. If the AMF is registered in UDM, the NSSAAF request the relevant AMF to revoke the S-NSSAI authorization for the UE using the Nnssaaf\_NSSAA\_RevocationNotification service operation.

The AMF is implicitly subscribed to receive Nnssaaf\_NSSAA\_RevocationNotification service operations. The NSSAAF may discover the Callback URI for the Nnssaaf\_NSSAA\_RevocationNotification service operation exposed by the AMF via the NRF. The AMF acknowledges the Notification of Revocation request.

5. The AMF removes any status it may have kept of the corresponding S-NSSAI subject to Network Slice-Specific Authentication and Authorisation in the UE context and sends the UE Configuration Update message to revoke the S-NSSAI from the current Allowed NSSAI, for any Access Type for which NSSAA had been successfully run on this S-NSSAI. The AMF provides a new Allowed NSSAI to the UE by removing the S-NSSAI for which authorization has been revoked. The AMF provides new rejected NSSAIs to the UE including the S-NSSAI for which authorization has been revoked. If no S-NSSAI is left in Allowed NSSAI for an access after the revocation, and a Default NSSAI exists that requires no NSSAA or for which a NSSAA did not previously fail over this access, then the AMF may provide a new Allowed NSSAI to the UE containing the Default NSSAI. If no S-NSSAI is left in Allowed NSSAI for an access after the revocation, and no Default NSSAI can be provided to the UE in the Allowed NSSAI or a previous NSSAA failed for the Default NSSAI over this access, then the AMF shall execute the Network-initiated Deregistration procedure for the access as described in subclause 4.2.2.3.3 in TS 23.502 [8], and it shall include in the explicit De-Registration Request message the list of Rejected S-NSSAIs, each of them with the appropriate rejection cause value.

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