**3GPP TSG-SA3 Meeting #116 *S3-241820r3***

Jeju, South Korea, 20th May – 24th May 2024

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
|  |
|  | **33.501** | **CR** | **1986** | **rev** | **-** | **Current version:** | **17.13.0** |  |
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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:***  | UDR control flag for NSWO |
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| ***Source to WG:*** | Nokia, Verizon, AT&T |
| ***Source to TSG:*** | S3 |
|  |  |
| ***Work item code:*** | TEI17 |  | ***Date:*** | 2024-05-10 |
|  |  |  |  |  |
| ***Category:*** | F |  | ***Release:*** | Rel-18 |
|  | *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 canbe 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:*** | NSWO based authentication is defined in the TS 33501 Annex S. *6. Based on the NSWO\_indicator, the AUSF (acting as the EAP authentication server) shall send a Nudm\_UEAuthentication\_Get Request to the UDM, including SUCI and the Access Network Identity and NSWO indicator.**7. Upon reception of the Nudm\_UEAuthentication\_Get Request, the UDM shall invoke SIDF. SIDF shall de-conceal SUCI to gain SUPI before UDM can process the request.* Based on the NSWO indicator, the UDM/ARPF shall select the EAP-AKA´ authentication method and generate an authentication vector using the Access Network Identity as the KDF input parameter. The UDM shall include the EAP-AKA’ authentication vector (RAND, AUTN, XRES, CK´ and IK´) and may include SUPI to AUSF in a Nudm\_UEAuthentication\_Get Response message.I.e. any valid UE can get this NSWOF based authentication service without any check in the UDR/UDM. Due to this, CT specs (TS 29.503) do not define any attribute in the UDR to validate if NSWO is allowed for the UE or not.However, there are many kinds of subscriptions or devices (i.e., IOT) where operators don’t want to apply NSWO-based authentication. But due to the way SA3 has defined the procedure, UDM cannot perform the any check.Due to this, any device, whether allowed or not, is able to access NSWO based authentication and Operators cannot disable NSWO for a particular UE.e.g. If all the services are barred for a UE, the UE can still use the NSWO authentication service. |
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| ***Summary of change:*** | When NSWO based authentiction request is received, UDM may reject the authentication based on the subscription data. |
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| ***Consequences if not approved:*** | Operators cannot disable NSWO for a particular UE, and all the UEs of the operators are by default allowed for NSWO.If all the services are barred for a UE, the UE can still use the NSWO authentication service. |
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| ***Clauses affected:*** | S.3.2 |
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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 \*\*\*\***

## S.3.2 5G NSWO procedures



Figure: S.3-1: Authentication procedure for NSWO in 5GS

1. The UE establishes a WLAN connection between the UE and the WLAN Access Network (AN), using procedures specified in IEEE 802.11[80].

2. The WLAN AN sends an EAP Identity/Request to the UE.

3. The UE sends an EAP Response/Identity message. If the UE determines to use the NSWO service, the UE shall use the SUCI in NAI format (as specified in TS 23.003 [19], clause 28.7.12 and clause 28.7.9.2) as its identity irrespective of whether SUPI Type configured on the USIM is IMSI or NAI. If the SUPI Type configured on the USIM is IMSI, the UE shall construct the SUCI in NAI format with username containing the encrypted MSIN and the realm part containing the MCC/MNC.

4. The EAP Response/Identity message shall be routed over the SWa interface towards the NSWOF based on the realm part of the SUCI.

NOTE 1: NSWOF acts as SBI/AAA proxy between the AUSF and the WLAN Access Network.

5. The NSWOF shall send the message Nausf\_UEAuthentication\_Authenticate Request with SUCI, Access Network Identity and NSWO indicator towards the AUSF. NSWO\_indicator is used to indicate to the AUSF that the authentication request is for Non-seamless WLAN offload purposes. The NSWOF shall set the Access Network Identity to "5G:NSWO".

6. Based on the NSWO\_indicator, the AUSF (acting as the EAP authentication server) shall send a Nudm\_UEAuthentication\_Get Request to the UDM, including SUCI and the Access Network Identity and NSWO indicator.

7. Upon reception of the Nudm\_UEAuthentication\_Get Request, the UDM shall invoke SIDF. SIDF shall de-conceal SUCI to gain SUPI before UDM can process the request. Based on the NSWO indicator and if NSWO is allowed based on subscription data, the UDM/ARPF shall select the EAP-AKA´ authentication method and generate an authentication vector using the Access Network Identity as the KDF input parameter. The UDM shall include the EAP-AKA’ authentication vector (RAND, AUTN, XRES, CK´ and IK´) and may include SUPI to AUSF in a Nudm\_UEAuthentication\_Get Response message.

8. The AUSF shall store XRES for future verification. The AUSF shall send the EAP-Request/AKA'-Challenge message to the NSWOF in a Nausf\_UEAuthentication\_Authenticate Response message.

NOTE: The Access Network Identity is carried in the AT\_KDF\_INPUT attribute in EAP-AKA' as defined in RFC 5448 [12].

9. The NSWOF shall send the EAP-Request/AKA'-Challenge message to the WLAN AN over the SWa interface.

10. The WLAN AN forwards the EAP-Request/AKA'-Challenge message to the UE.

11. At receipt of the RAND and AUTN in the EAP-Request/AKA'-Challenge message, the ME shall obtain the Access Network Identity from the EAP signalling and the USIM in the UE shall verify the freshness of the AV' by checking whether AUTN can be accepted as described in TS 33.102 [40]. If so, the USIM computes a response RES. The USIM shall return RES, CK, IK to the ME. The ME shall derive CK' and IK' using the Access Network Identity as the KDF input parameter. If the verification of the AUTN fails on the USIM, then the USIM and ME shall proceed as described in sub-clause 6.1.3.3. The UE may derive MSK from CK’ and IK’ as per Annex F and as described in RFC 5448[12]. When the UE is performing NSWO authentication, the KAUSF shall not be generated by the UE.

12. The UE shall send the EAP-Response/AKA'-Challenge message to the WLAN AN.

13. The WLAN AN forwards the EAP-Response/AKA'-Challenge message over the SWa interface to the NSWOF.

14. The NSWOF shall send the Nausf\_UEAuthentication\_Authenticate Request with EAP-Response/AKA'-Challenge message to AUSF.

15. The AUSF shall verify if the received response RES matches the stored and expected response XRES. If the AUSF has successfully verified, it continues as follows to step 16, otherwise it returns an error to the NSWOF. The AUSF shall derive the required MSK key from CK’ and IK’ as per Annex F and as described in RFC 5448[12], based on the NSWO indicator received in step 5. The AUSF shall not generate the KAUSF.

16. The AUSF shall send Nausf\_UEAuthentication\_Authenticate Response message with EAP-Success and MSK key to NSWOF. The AUSF may optionally provide the SUPI to NSWOF. The AUSF/UDM shall not perform the linking increased home control to subsequent procedures (as stated in present document clause 6.1.4).

17. The NSWOF shall send the EAP-success and MSK to WLAN AN over the SWa interface. The EAP-Success message is forwarded from WLAN AN to the UE.

18. Upon receiving the EAP-Success message, the UE derives the MSK as specified in step 11, if it has not derived the MSK earlier. The UE uses the first 256-bit of MSK as PMK to perform 4-way handshake to establish a secure connection with the WLAN AN.

**\*\*\*\* END OF CHANGES \*\*\*\***