**3GPP TSG-SA3 Meeting #105-e  *draft\_S3-213890-r4***

e-meeting, 08 - 19 November 2021

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
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|  | **33.501** | **CR** | **1202** | **rev** | **1** | **Current version:** | **17.3.0** |  |
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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 | **x** | ME | **x** | Radio Access Network |  | Core Network | **x** |

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| ***Title:***  | Support for NSWO in 5GS |
|  |  |
| ***Source to WG:*** | Nokia, Nokia Shanghai Bell,AT&T,Lenovo,Motorola Mobility,Qualcomm Incorporated |
| ***Source to TSG:*** | SA3 |
|  |  |
| ***Work item code:*** | DUMMY |  | ***Date:*** | 2021-11-08 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | Rel-17 |
|  | *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:*** | This CR specifies the support of Authentication procedures for NSWO in 5GS and it depends on the new normative WID approval. |
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| ***Summary of change:*** | Authentication procedures for NSWO in 5GS is specified. |
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| ***Consequences if not approved:*** | NSWO not supported in 5GS. |
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| ***Clauses affected:*** | Annex X (new) |
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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 ...  |
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| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* Start of Change \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

# 2 References

[YY] 3GPP TS 23.402: "Authentication enhancements for non-3GPP accesses".

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* Next Change\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

# 3.2 Abbreviations

NSWO Non-Seamless WLAN Offload

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Annex X (normative): Support for Non-seamless WLAN offload (NSWO) in 5GS

# X.1 General

Non-seamless WLAN offload (NSWO) is an optional capability of a UE supporting WLAN radio access. A UE supporting non-seamless WLAN offload may, while connected to WLAN access, route specific IP flows via the WLAN access without traversing the 3GPP core network.

The present annex specifies the support for authentication for NSWO in 5GS (5G NSWO).

# X.2 Authentication

5G NSWO shall use EAP-AKA’, as specified in RFC 5448 [12], for authentication. The EAP-AKA’ implementations shall comply with the EAP-AKA’ profile specified in Annex F of the present document.

A new network function, called NSWO NF, is introduced to support authentication for NSWO in 5GS. The NSWO NF interfaces to the WLAN access network using SWa interface and interfaces to the AUSF using Service Based Interface (SBI).

Editor’s Note: The above text may need to be updated to align with NSWO architecture in TS 23.501.

# X.2 Authentication procedure

An HPLMN that supports 5G NWSO and wants the UE to use 5G NSWO shall configure the UE to use 5G NSWO. This configuration shall be either on the USIM or ME, with configuration on the USIM taking precedence over the ME.

A UE that supports 5G NSWO and is configured to use 5G NSWO shall always use 5G NSWO (i.e., it shall not use LTE NSWO defined in TS 23.402[YY]).

NOTE: Such a configuration ensures that the UE supporting 5G NSWO cannot be downgraded to use LTE NSWO.



1.When the UE decides to perform NSWO, 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. The UE shall use the SUCI in NAI format (i.e., username@realm format) 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 ME shall construct the SUCI in NAI format with username containing the encrypted MSIN and the realm part containing the MCC/MNC.

Editor’s Note: username@realm format will need to be specified for SUCI in NAI format in clause 28.7.3 of TS 23.003.

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

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

5.The NSWO NF shall send the message Nausf\_UEAuthentication\_Authenticate Request with SUCI, Serving Network name 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 NSWO NF shall set the Serving Network name to “5G:NSWO”.

6.The AUSF (acting as the EAP authentication server) shall send a Nudm\_UEAuthentication\_Get Request to the UDM including SUCI and the NSWO indicator.

7.Upon reception of the Nudm\_UEAuthentication\_Get Request, the UDM shall invoke SIDF if a SUCI is received. 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. UDM shall generate and 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 NSWO NF in a Nausf\_UEAuthentication\_Authenticate Response message.

9.The NSWO NF 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 construct the SN name by setting it to “5G:NSWO”, 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' according to Annex A.3. 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 shall derive the MSK as described in RFC 5448[12]. The UE uses MSK as the pre-shared key for 4-way handshake when it is using NSWO. 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 NSWO NF.

14.The NSWO NF 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 will continue as follows to step 16, otherwise it will return an error to the NSWO NF.

16.The AUSF shall derive the required MSK key from CK’ and IK’ as per Annex F as described in RFC 5448[12]. The KAUSF shall not be generated by the AUSF. The AUSF shall send Nausf\_UEAuthentication\_Authenticate Response message with EAP-Success and MSK key to NSWO NF. The AUSF may optionally provide the SUPI to NSWO NF.

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 NSWO NF 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 may use the MSK to perform a 4-way handshake with the WLAN AN to establish a secure connection with the WLAN AN.

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