**3GPP TSG-CT WG1 Meeting #137-eC1-225039**

**E-Meeting, 18th – 26th August 2022**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **24.502** | **CR** | 0199 | **rev** | 4 | **Current version:** | 17.6.0 |  |
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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 | **x** | Radio Access Network |  | Core Network | **X** |

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| ***Title:*** | NSWO 5G roaming clarifications | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Nokia, Nokia Shanghai Bell, ZTE | | | | | | | | | |
| ***Source to TSG:*** | C1 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NSWO\_5G | | | | |  | ***Date:*** | | | 2022-07-01 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***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 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:*** | | Annex S4 of TS 33.501 NSWO in 5GS roaming requirements. also states:  "The HPLMN may have a roaming agreement with a VPLMN for NSWO roaming. A roaming UE configured by the HPLMN to use 5G NSWO may try to register onto a WLAN AN that may advertise the HPLMN or a VPLMN (with which the HPLMN has a roaming agreement for NSWO roaming). The roaming architecture options are described in clause 4.2.15 in TS 23.501 [2]."  Thus, in roaming scenarios, while in the VPLMN, the UE shall use a decorated SUCI in NAI format as specified in TS.23.003, including the VPLMN ID.  As per stage-2 requirements, the use of decorated NAI is not including any info of the service provider, even if one has been indicated via ANQP procedures. | | | | | | | | |
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| ***Summary of change:*** | | 1)Update EN to align with SA2 decisions on the case that multiple PLMNs are advertised.  2)Add the reference for the use of decorated NAIs for NSWO in 5GS while roaming  3) Add that the advertised PLMN ID is used | | | | | | | | |
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| ***Consequences if not approved:*** | | NSWO in 5GS cannot be used while roaming | | | | | | | | |
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| ***Clauses affected:*** | | 5.3.2.3, 6.3a | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | | The details for the case of multiple PLMNs being advertised are to be handled as per conclusion of CR 3697 of TS 23.501. | | | | | | | | |
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| ***This CR's revision history:*** | | This is a new CR, using the correct baseline, but by mistake it has been indicated of a revision of an older related CR see C1-224258. | | | | | | | | |

1st change

#### 5.3.2.3 Automatic mode WLAN selection

The UE shall first determine valid WLANSP rules for WLAN selection:

a) if the UE is not roaming over 3GPP access, the UE shall use the valid WLANSP rules from the HPLMN; or

b) if the UE is roaming over 3GPP access, the UE may have valid WLANSP rules from several of the visited PLMN, a PLMN equivalent to the visited PLMN and the home PLMN. The UE uses the WLANSP rules in the following order of decreasing priority:

1) the valid WLANSP rules from the visited PLMN;

2) the valid WLANSP rules from the equivalent PLMN in which the UE last received WLANSP; and

3) the valid WLANSP rules from the home PLMN.

The UE shall then determine the selected WLAN(s) according to the following steps:

a) use the procedures specified in the IEEE 802.11 [19] to discover the available WLANs. The UE may perform ANQP procedures as specified in the IEEE 802.11 [19] or the Hotspot 2.0 [20] to discover the attributes and capabilities of available WLANs. If the UE supports ANQP procedures, the UE may send an ANQP request for lists of service providers (i.e. ANQP-elements "Domain Name", see IEEE 802.11 [19]) and PLMN identities (i.e. ANQP-element "3GPP Cellular Network", see 3GPP TS 24.302 [7] annex H); and

b) if the UE has performed ANQP procedures to discover the attributes and capabilities of available WLANs, compare the attributes and capabilities of the available WLANs with the group of selection criteria of the valid WLANSP rules and construct a prioritized list of available WLANs that fulfill the selection criteria.

1) when there are multiple valid WLANSP rules the UE evaluates the valid WLANSP rules in priority order. The UE evaluates first if an available WLAN access meets the selection criteria of the highest priority valid WLANSP rule. The UE then evaluates if an available WLAN access meets the selection criteria of the next priority valid WLANSP rule;

NOTE 1: Each WLANSP rule can include one or more groups of selection criteria in priority order. If there are multiple highest priority groups of selection criteria in the valid WLANSP rule, it is up to the UE implementation which one to use.

2) if the Home network ind bit is not set to "1" in the group of selection criteria (see 3GPP TS 24.526 [17]), the WLAN(s) that match the group of selection criteria with the highest priority are considered as the most preferred WLANs, the WLAN(s) that match the group of selection criteria with the second highest priority are considered as the second most preferred WLANs;

3) if the Home network ind bit is set to "1" in the group of selection criteria (see 3GPP TS 24.526 [17]), then the UE shall create a list of available WLANs and shall apply the group of selection criteria to all the WLANs in this list. A WLAN is included in this list, if

i) the other selection criteria in the active WLANSP rule are met; and

ii) the UE received a lists of service providers (i.e. ANQP-elements "Domain Name") and PLMN identities (i.e. ANQP-element "3GPP Cellular Network"), and:

I) if the list with PLMNs that can be selected from the WLAN (see 3GPP TS 24.302 [7]) includes:

A) the HPLMN derived from its IMSI; or

B) a PLMN matching an entry in the UE's list of equivalent PLMNs; or

II) if the domain name list (see IEEE 802.11 [19]) includes:

A) the home domain name derived from its IMSI; or

B) the domain name derived from its list of equivalent PLMNs; and

NOTE 2: If the Home network ind bit is set to "1" in a group of selection criteria then this group of selection criteria is not expected to include the preferred roaming partner list and the preferred SSID list.

NOTE 3: WLAN advertises PLMN(s) towards which the S2a connectivity or the 5G connectivity using trusted non-3GPP access is supported by using the ANQP-element "3GPP Cellular Network" with the PLMN List with S2a Connectivity IE, the PLMN List with trusted 5G connectivity IE or the PLMN List with trusted 5G connectivity-without-NAS IE in the payload (see 3GPP TS 24.302 [7] Annex H). The PLMN List with trusted 5G connectivity-without-NAS IE is only used by N5CW devices. If the UE selects a PLMN over WLAN included in both the PLMN List with S2a Connectivity IE, and the PLMN List with trusted 5G connectivity IE, the UE requests the PLMN with trusted 5G connectivity (see 3GPP TS 23.501 [2] clause 6.3.12.2).

4) The priority of a WLAN in the available WLANs list is set to the WLAN priority defined in the preferredSSIDlist of the matching group of selection criteria. There may be one or more selected WLANs in the list.

A UE that:

a) supports NSWO in 5GS;

b) is configured to use NSWO in 5GS; and

c) has received a PLMN identity via ANQP procedures;

shall construct a NAI for authentication as follows:

a) a root NAI corresponding to the HPLMN, if the HPLMN is advertised; or

b) a decorated NAI including the realm of the VPLMN, otherwise.

The NAI formats to be used above are specified in 3GPP TS 23.003 [3].

Editor's Note: [NSWO\_5G, CR 0199] How the PLMN is selected, if multiple PLMNs are advertised, is FFS.

2nd change

## 6.3a Authentication for NSWO in 5GS

A UE that supports NSWO in 5GS and is configured to use NSWO in 5GS, shall not perform NSWO in EPS. NSWO in 5GS capability can be enabled and disabled via configuration on the USIM (see 3GPP TS 31.102 [35]) or on the ME. Configuration on the USIM shall take precedence over the ME.

WLAN selection is performed according to the procedure described in clause 5.3.2.

In order to use NSWO in 5GS, and if the WLAN access network requires 5GS-based authentication of a UE to connect to the WLAN, the UE shall perform the EAP-AKA' authentication procedure as specified in 3GPP TS 33.501 [5] annex S.3. The UE shall use as its identity the SUCI in NAI format as defined in clause 28.7.3 of 3GPP TS 23.003 [8].

NOTE: The same NAI format is used over both trusted and untrusted non-3GPP access networks for NSWO in 5GS, which is different from the NAI format used for registration over trusted non-3GPP access specified in clause 28.7.6 of 3GPP TS 23.003 [8].

Upon receipt of an EAP-Request/AKA'-Challenge message the UE shall apply the rules for comparison of the locally determined ANID "5G:NSWO" (see table 8.1.1.2-2 of 3GPP TS 24.302 [7]) and the Network Name field of the AT\_KDF\_INPUT attribute received in the EAP-Request/AKA'-Challenge message as specified in IETF RFC 5448 [38].

A roaming UE that supports NSWO in 5GS and is configured to use NSWO in 5GS shall use as its identity the SUCI in decorated NAI format, as specified in clause 28.7.9 of 3GPP TS 23.003 [8] and according to the procedure described in clause 5.3.2.3.

End of changes