**3GPP TSG-CT WG1 Meeting #141-eC1-232364**

**E-Meeting, 17th - 21st April, 2023**

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| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
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|  |  | **CR** |  | **rev** | **1** | **Current version:** |  |  |
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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:***  |  |
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| ***Source to WG:*** |  |
| ***Source to TSG:*** |  |
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| ***Work item code:*** |  |  | ***Date:*** |  |
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| ***Category:*** |  |  | ***Release:*** |  |
|  | *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-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)* |
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| ***Reason for change:*** | SA2 has agreed in CR3821 to 23.501 (see S2-2303635) clause 5.30.2.15 that that N5CW devices may access 5GC in an SNPN via a trusted WLAN access network that supports a TWIF function. A WLAN access network may advertise (e.g. with ANQP), not only the PLMNs with which "5G connectivity-without-NAS" is supported (as specified in clause 6.3.12a.1), but also the SNPNs with which "5G connectivity-without-NAS" is supported, as well as the related parameters and indications defined in clause 5.30.2.2 (i.e. human-readable network name(s), GIN(s), indication whether access using credentials from a Credentials Holder is supported, indication whether SNPN allows registration attempts from UEs that are not explicitly configured to select the SNPN):*5.30.2.15 Access to SNPN services for N5CW devices**Devices that do not support 5GC NAS signalling over WLAN access (referred to as "Non-5G-Capable over WLAN" devices, or N5CW devices for short), may access 5GC in an SNPN via a trusted WLAN access network that supports a TWIF function. To access SNPN services the N5CW device performs the following procedure:**- A WLAN access network may advertise (e.g. with ANQP), not only the PLMNs with which "5G connectivity-without-NAS" is supported (as specified in clause 6.3.12a.1), but also the SNPNs with which "5G connectivity-without-NAS" is supported, as well as the related parameters and indications defined in clause 5.30.2.2 (i.e. human-readable network name(s), GIN(s), indication whether access using credentials from a Credentials Holder is supported, indication whether SNPN allows registration attempts from UEs that are not explicitly configured to select the SNPN).**- The N5CW device initiates the access network selection procedure by sending an ANQP query to each discovered WLAN access network and constructs a list of available SNPNs with which "5G connectivity-without-NAS" is supported. This list contains the SNPNs with which "5G connectivity-without-NAS" is supported as advertised by all the discovered WLAN access networks.**- The N5CW device selects an SNPN that is included in the list of available SNPNs with which "5G connectivity-without-NAS" is supported following the procedure in clause 5.30.2.4.**- The N5CW device selects a WLAN access network (e.g. an SSID) that supports "5G connectivity-without-NAS" to the selected SNPN and initiates the "Initial Registration and PDU Session Establishment" procedure specified in clause 4.12b.2 of TS 23.502 [3]. If there are multiple WLAN access networks that support "5G connectivity-without-NAS" to the selected SNPN, then the N5CW device selects the highest priority WLAN access network from this list. To determine the priority of a WLAN access network, the N5CW device shall apply the WLANSP rules (if provided), and the procedure specified in clause 6.6.1.3 of TS 23.503 [45], "UE procedure for selecting a WLAN access based on WLANSP rules". If the N5CW device is not provided with WLANSP rules, the N5CW device determines the priority of a WLAN access network by using implementation means.**NOTE: How the N5CW device selects credentials to use for SNPN access is implementation specific.*Accordingly, this CR adds non-3GPP access support for N5CW devices in SNPN. |
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| ***Summary of change:*** | Add non-3GPP access support for N5CW devices in SNPN. |
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| ***Consequences if not approved:*** | Non-3GPP access for N5CW devices in SNPN not supported. |
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| ***Clauses affected:*** | 5.3.2.3, 5.3D.1, 5.3D.2, 5.3D.4.1 |
|  |  |
|  | **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:*** |  |

\*\*\* First change \*\*\*

#### 5.3.2.3 Automatic mode WLAN selection

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

If the UE is not operating in SNPN access operation mode:

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.

If the UE is operating in SNPN access operation mode over non-3gpp access:

a) the UE shall select one entry in the "list of subscriber data", if any, or the PLMN subscription, if any, to be used for automatic mode WLAN selection. How the UE selects the entry in the "list of subscriber data" or the PLMN subscription is UE implementation specific; and

b) the UE uses the valid WLANSP rules

- pre-configured from the subscribed SNPN or CH with AAA server and stored in the selected entry of the "list of subscriber data", if selected or HPLMN (associated with the PLMN subscription, if selected); or

- received from the PCF of the subscribed SNPN associated with the selected entry of the "list of subscriber data" if selected) or HPLMN (associated with the PLMN subscription, if selected).

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]), PLMN identities or SNPN identities or both (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 is not operating in SNPN access operation mode and 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

iii) the UE is operating in SNPN access operation mode over non-3gpp access and the UE received a lists of service providers (i.e. ANQP-elements "Domain Name") and SNPN identities (i.e. ANQP-element "3GPP Cellular Network"), and:

I) if the UE is registered over 3GPP access and the list with SNPNs that can be selected from the WLAN (see 3GPP TS 24.302 [7]) includes the registered SNPN;

II) if the UE is not registered over 3GPP access and the list with SNPNs that can be selected from the WLAN (see 3GPP TS 24.302 [7]) includes an SNPN identity of the subscribed SNPN in the selected entry of the "list of subscriber data" or associated with the PLMN subscription; or

III) if the domain name list (see IEEE 802.11 [19]) includes the home network domain of an SNPN identity as defined in TS 23.003 [16] clause 28.2 included in the selected entry of the "list of subscriber data" or associated with the PLMN subscription; 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 AAA connectivity to EPC or the S2a connectivity is supported by using the ANQP-element "3GPP Cellular Network" with the PLMN List IE or the PLMN List with S2a Connectivity IE in the payload (see annex H in 3GPP TS 24.302 [7]).

NOTE 4: WLAN advertises SNPN(s) towards which the 5G connectivity using trusted non-3GPP access is supported by using the ANQP-element "3GPP Cellular Network" with the SNPN List with trusted 5G connectivity IE or the SNPN List with trusted 5G connectivity-without-NAS IE in the payload (see annex H in 3GPP TS 24.302 [7]). The SNPN List with trusted 5G connectivity-without-NAS IE is only used by N5CW devices.

NOTE 5: WLAN advertises PLMN(s) towards which the 5G connectivity using trusted non-3GPP access or the AAA connectivity to 5GC is supported by using the ANQP-element "3GPP Cellular Network" with the PLMN List with trusted 5G connectivity IE, the PLMN List with trusted 5G connectivity-without-NAS IE or PLMN List with AAA connectivity to 5GC IE in the payload (see annex H in 3GPP TS 24.302 [7]). The PLMN List with trusted 5G connectivity-without-NAS IE is only used by N5CW devices.

NOTE 6: 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 clause 6.3.12.2 in 3GPP TS 23.501 [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.

NOTE 7: UE implementation can optimize the steps described above, e.g. by combining the ANQP procedures.

\*\*\* Next change \*\*\*

### 5.3D.1 General

When the UE is operating in SNPN access operation mode there are two modes of SNPN selection, namely, manual SNPN selection and automatic SNPN selection.

The UE follows one of the following two procedures defined in clause 5.3.2.2 and clause 5.3.2.3 depending on its implementation. The N5CW device that is not registered or cannot register via NG-RAN performs manual mode WLAN selection procedure as defined in clause 5.3.2.2.

The SNPN is selected in accordance with these procedures determines the WLAN that is selected. When the selected WLAN is a trusted non-3GPP IP access and the UE decides to access 5GC via trusted non-3GPP IP access, the UE shall derive a NAI from the identity of the selected SNPN and use the NAI as the identity for authentication and authorization with the SNPN and usage of the WLAN.

The procedures described in this clause 5.3D shall apply to the UE and the N5CW device.

\*\*\* Next change \*\*\*

### 5.3D.2 SNPN solicitation

The UE operating in SNPN access operation mode shall determine which SNPNs are available from each WLAN on the list of available WLANs constructed using the WLAN selection procedure described in clause 5.3.2 using the following procedures:

i) the UE selects a WLAN from the list of selected WLAN(s) constructed using the WLAN selection procedure described in clause 5.3.2;

NOTE 1: An N5CW device that is not registered or cannot register via NG-RAN uses only the manual mode WLAN selection procedure described in clause 5.3.2.2.

ii) if both the WLAN selected in step i) and the UE support ANQP specified in IEEE Std 802.11 [19] and if the UE did not obtain a list of realms using ANQP in clause 5.3.2.3 item 1, the UE shall send an ANQP request for a list of realms (i.e. ANQP-elements "NAI Realm") and/or SNPN identities (i.e. ANQP-element "3GPP Cellular Network"); and

NOTE 2: The UE uses procedures defined in IEEE Std 802.11 [19] to determine if the WLAN supports ANQP and to send the ANQP request for ANQP-elements "NAI Realm" and/or "3GPP Cellular Network", as specified in IEEE Std 802.11 [19].

iii) if either the WLAN selected in step i) or the UE does not support ANQP (see IEEE Std 802.11 [19]) or the UE does not receive a list of realms in item ii), an EAP-Request/Identity is received and the EAP-Request/Identity does not include one or more of realms and SNPN identities (encoded in accordance with IETF RFC 4284 [31]), the UE supports IEEE 802.1x authentication (see IEEE Std 802.1X™ [30]), the UE shall request a list of realms and/or SNPN identities interworking with that WLAN by sending the EAP-Response/Identity message including as identity the alternative NAI; and

iv) the UE repeats this procedure for all WLANs from the available list of WLANs as constructed using the WLAN selection procedure described in clause 5.3.2.

NOTE 3: The list with realms and/or SNPN identities received in accordance with procedures in IETF RFC 4284 [31], is of limited size and might not contain all the realms and/or SNPN identities available via the WLAN.

The UE shall convert any received SNPN identities into realms of the SNPNs using the rules defined in clause 19 and clause 28 of 3GPP TS 23.003 [8]. The N5CW device shall convert any received SNPN identities into realms of the SNPNs using the rules defined in clause 28 of 3GPP TS 23.003 [8].

\*\*\* Next change \*\*\*

#### 5.3D.4.1 General

The purpose of this procedure is for the UE operating in SNPN access operation mode to:

- select an SNPN over WLAN; and

- construct a NAI for use with authentication signalling with the selected SNPN in order for the UE to be authorised to use the WLAN.

The UE shall select one entry in the "list of subscriber data", if any, or the PLMN subscription, if any, to be used for automatic mode SNPN selection. How the UE selects the entry in the "list of subscriber data" or the PLMN subscription is UE implementation specific.

Until the highest priority SNPN is found, the UE shall verify if a SNPN available over a WLAN of the selected WLAN(s) is the highest priority SNPN:

1) using the SNPNs which are available for WLAN as described in clause 5.3A.2, the UE uses the realms of the SNPN in the remaining steps of this clause;

2) if the UE is registered over 3GPP access, the realm of the RSNPN of the 3GPP access is included in the list of realms created in clause 5.3A.2, if the realm of the RSNPN of the 3GPP access does not match a realm converted from any SNPN ID in the "temporarily forbidden SNPNs" list for non-3GPP access or "permanently forbidden SNPNs" list for non-3GPP access associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription, then the UE shall select the RSNPN of the 3GPP access;

3) if the condition in step 2) is not satisfied, the UE shall select, in priority order, an SNPN from the list of realms created in clause 5.3A.2, if:

i) the SNPN identified by an SNPN identity of the subscribed SNPN in the selected entry of the "list of subscriber data";

ii) if the UE supports access to an SNPN using credentials from a credentials holder, using the SNPN selection parameters in the selected entry of the "list of subscriber data" or associated with the selected PLMN subscription:

I) each SNPN indicating that access using credentials from a credentials holder is supported and which is identified by an SNPN identity contained in the user controlled prioritized list of preferred SNPNs (in priority order);

II) each SNPN indicating that access using credentials from a credentials holder is supported and which is identified by an SNPN identity contained in the credentials holder controlled prioritized list of preferred SNPNs (in priority order);

III) each SNPN indicating that access using credentials from a credentials holder is supported and indicating a GIN contained in the credentials holder controlled prioritized list of GINs (in priority order). If more than one such SNPN indicate the same GIN, the priority order is UE implementation specific;

III) each SNPN identified by an SNPN identity which is included neither in the SNPN selection parameters of the entries of the "list of subscriber data" nor in the SNPN selection parameters associated with the PLMN subscription, which does not indicate a GIN which is included in the credentials holder controlled prioritized list of GINs, and which indicates that the SNPN allows registration attempts from UEs that are not explicitly configured to select the SNPN. If more than one such SNPN is available, the order in which the UE attempts registration on those SNPNs is UE implementation specific.

Editor’s Note [WI: eNPN\_Ph2, CR#0217]: How the UE constructs the NAI for authentication with the highest priority SNPN is for further study.

NOTE 1: UE implementations can optimize the steps described above, e.g. by combining the ANQP procedures described in clause 5.3C.2 with the ANQP procedures in clause 5.3.2.3.

NOTE 2: Selecting a WLAN from multiple WLANs advertising support for the selected SNPN is UE implementation specific.

NOTE 3: The N5CW device which is not registered or cannot register via NG-RAN only uses the SNPN List with trusted 5G Connectivity-without-NAS IE, and the SNPN List with trusted 5G Connectivity-without-NAS IE is only used by the N5CW devices.

\*\*\* End change \*\*\*