**3GPP TSG-CT WG1 Meeting #133e-bisC1-22xxxx**

**E-meeting, 17-21 January 2022**

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
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|  | **23.122** | **CR** | **0872** | **rev** | **1** | **Current version:** | **17.5.0** |  |
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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 |  |

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| ***Title:***  | SNPN selection for onboarding services with lists of forbidden SNPNs |
|  |  |
| ***Source to WG:*** | Nokia, Nokia Shanghai Bell |
| ***Source to TSG:*** | C1 |
|  |  |
| ***Work item code:*** |  |  | ***Date:*** | 2022-01-17 |
|  |  |  |  |  |
| ***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:*** | 1/Via CR# 3507 to 3GPP TS 24.501, it was agreed that receipt of an AUTHENTICATION REJECT message from an ON-SNPN makes a UE store the ID of the ON-SNPN in the "permanently forbidden SNPNs" list for the specific access type for which the message was received (rather than invalidating the default UE credentials).Similar handling should be specified for 5GMM cause values #3, #6, and #7, i.e. these 5GMM cause values should impact the "permanently forbidden SNPNs" list, not the validity of the default UE credentials.2/Use of the lists of forbidden SNPNs is not specified for the ON-SNPN selection process. |
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| ***Summary of change:*** | 1/It is specified that 5GMM cause values #3, #6, and #7 impact the “permanently forbidden SNPNs” list.2/Use of the lists of forbidden SNPNs is specified for the ON-SNPN selection process |
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| ***Consequences if not approved:*** | Use of with lists of forbidden SNPNs during the ON-SNPN selection remains unclear. |
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| ***Clauses affected:*** | 4.9.3.0, 4.9.3.1.4 |
|  |  |
|  | **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:*** |  |

#### 4.9.3.0 General

The ME is configured with a "list of subscriber data" containing zero or more entries. Each entry of the "list of subscriber data" consists of:

a) a subscriber identifier in the form of a SUPI with the SUPI format "network specific identifier" containing a network-specific identifier or with the SUPI format "IMSI" containing an IMSI, except when the SNPN uses:

1) the EAP based primary authentication and key agreement procedure using the EAP-AKA'; or

2) the 5G AKA based primary authentication and key agreement procedure;

NOTE 1: A subscriber identifier in the form of a SUPI with the SUPI format "network specific identifier" containing a network-specific identifier or with the SUPI format "IMSI" containing an IMSI, is available in USIM if the SNPN uses the EAP based primary authentication and key agreement procedure using the EAP-AKA' or the 5G AKA based primary authentication and key agreement procedure.

NOTE 2: If the MS supports access to an SNPN using credentials from a credentials holder and is configured with the SNPN selection parameters as described in h), the subscriber identifier in the form of a SUPI configured in the ME or the USIM needs to be:

- with the SUPI format "network specific identifier"; or

- with the SUPI format "IMSI", if the subscribed SNPN has an assigned PLMN ID.

b) credentials except when the SNPN uses:

1) the EAP based primary authentication and key agreement procedure using the EAP-AKA'; or

2) the 5G AKA based primary authentication and key agreement procedure;

NOTE 3: Credentials are available in USIM if the SNPN uses the EAP based primary authentication and key agreement procedure using the EAP-AKA' or the 5G AKA based primary authentication and key agreement procedure.

c) an SNPN identity of the subscribed SNPN;

d) optionally, the unified access control configuration indicating for which access identities (see 3GPP TS 24.501 [64]) the ME is configured in the SNPN;

e) optionally, the pre-configured URSP (see 3GPP TS 24.526 [77]);

f) optionally, the default configured NSSAI (see 3GPP TS 24.501 [64]);

g) optionally, if the MS supports access to an SNPN using credentials from a credentials holder, the SNPN selection parameters, consisting of:

1) a user controlled prioritized list of preferred SNPNs, where each entry contains an SNPN identity;

2) a credentials holder controlled prioritized list of preferred SNPNs, where each entry contains an SNPN identity; and

3) a credentials holder controlled prioritized list of Group IDs for Network Selection (GINs); and

Editor's Note: It is FFS whether a mechanism is needed to prevent registration attempts from MSs not explicitly configured to select an SNPN in an SNPN which broadcasts an indication that the SNPN allows registration attempts from MSs that are not explicitly configured to select the SNPN.

NOTE 4: How the ME is configured with the "list of subscriber data" is out of scope of 3GPP in this release of the specification.

NOTE 5: Multiple entries can include the same subscriber identifier and credentials.

NOTE 6: Handling of more than one entry with the same SNPN identity is left up to MS implementation.

NOTE 7: Handling of the case when the SNPN uses the EAP based primary authentication and key agreement procedure using the EAP-AKA' or the 5G AKA based primary authentication and key agreement procedure and the MS has multiple valid USIMs (3GPP TS 31.102 [40]) is left up to MS implementation.

NOTE 8: To enable UE mobility between SNPNs in 5GMM-IDLE mode, SNPN identities in the credentials holder controlled prioritized list of preferred SNPNs are assumed to be globally-unique SNPN identities.

h) optionally:

1) an indication of whether the MS shall ignore all warning messages received in the subscribed SNPN; and

2) an indication of whether the MS shall ignore all warning messages received in an SNPN other than the subscribed SNPN.

The MS which supports onboarding services in SNPN shall be pre-configured with default UE credentials and may be pre-configured with onboarding SNPN network selection information. Contents of the onboarding SNPN network selection information are MS implementation specific. Contents of default UE credentials are out of scope of 3GPP.

Additionally, if the MS has a USIM with a PLMN subscription, the ME may be configured with the SNPN selection parameters associated with the PLMN subscription, consisting of:

a) a user controlled prioritized list of preferred SNPNs, where each entry contains an SNPN identity;

b) a credentials holder controlled prioritized list of preferred SNPNs, where each entry contains an SNPN identity; and

c) a credentials holder controlled prioritized list of GINs.

NOTE 9: To enable MS mobility between SNPNs in 5GMM-IDLE mode, SNPN identities in the credentials holder controlled prioritized list of preferred SNPNs are assumed to be globally-unique SNPN identities.

NOTE 10: If an MS accesses an SNPN using the PLMN subscription, access identity 1, 2, 12, 13, or 14 is configured in the USIM of the MS, and the MS is in the home country, then the configured access identity 1, 2, 12, 13, or 14 is applicable for the MS.

Editor's note: It is FFS how a UE operating in SNPN access mode determines whether it is in the home country.

Editor's note: Whether the ME can be configured with a pre-configured URSP is FFS.

Editor's note: Whether the ME can be configured with a default configured NSSAI is FFS.

Editor's note [WI eNPN, CR#0745]: Whether the configuration parameter for reception of warning messages in an SNPN is stored in the ME or in the USIM when the UE is using a PLMN subscription to access an SNPN needs to be confirmed by SA1.

The MS shall maintain a list of "temporarily forbidden SNPNs" and a list of "permanently forbidden SNPNs" in the ME. Each entry of those lists consists of an SNPN identity. If the MS supports access to an SNPN using credentials from a credentials holder, the MS shall maintain one list of "temporarily forbidden SNPNs" and one list of "permanently forbidden SNPNs" per entry of the "list of subscriber data" or the PLMN subscription, and shall use the lists associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription. In addition, if the MS supports onboarding services in SNPN, a "permanently forbidden SNPNs" list for onboarding services and a "temporarily forbidden SNPNs" list for onboarding services shall be maintained.

The MS shall add an SNPN to the list of "temporarily forbidden SNPNs" which is, if the MS supports access to an SNPN using credentials from a credentials holder, associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription, if a message with cause value #74 "Temporarily not authorized for this SNPN" (see 3GPP TS 24.501 [64]) is received by the MS in response to an LR request from the SNPN. In addition, if:

- the message is integrity-protected; or

- the message is not integrity-protected, and the value of the SNPN-specific attempt counter for that SNPN is equal to the MS implementation specific maximum value as defined in 3GPP TS 24.501 [64];

then the MS shall start an MS implementation specific timer not shorter than 60 minutes.

The MS shall remove an SNPN from the list of "temporarily forbidden SNPNs" which is, if the MS supports access to an SNPN using credentials from a credentials holder, associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription, if:

a) there is a successful LR after a subsequent manual selection of the SNPN;

b) the MS implementation specific timer not shorter than 60 minutes expires;

c) the MS is configured to use timer T3245 and timer T3245 expires;

d) the MS is not configured to use timer T3245, the timer T3247 expires and the value of the SNPN-specific attempt counter for that SNPN is less than the MS implementation specific maximum value as defined in 3GPP TS 24.501 [64];

e) the MS is switched off;

f) an entry of the "list of subscriber data" with the subscribed SNPN identity identifying the SNPN is updated or the USIM is removed if:

- EAP based primary authentication and key agreement procedure using EAP-AKA'; or

- 5G AKA based primary authentication and key agreement procedure;

 was performed in the selected SNPN; or

g) the selected entry of the "list of subscriber data" is updated or USIM is removed for the selected PLMN subscription.

If an SNPN is removed from the list of "temporarily forbidden SNPNs" list, the MS shall stop the MS implementation specific timer not shorter than 60 minutes, if running.

The MS shall add an SNPN to the list of "permanently forbidden SNPNs" which is, if the MS supports access to an SNPN using credentials from a credentials holder, associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription, if a message with cause value #75 "Permanently not authorized for this SNPN", #3 "Illegal UE" (applicable in an onboarding SNPN only), #6 "Illegal ME" (applicable in an onboarding SNPN only), or #7 "5GS services not allowed" (applicable in an onboarding SNPN only) (see 3GPP TS 24.501 [64]) is received by the MS in response to an LR request from the SNPN.

The MS shall remove an SNPN from the list of "permanently forbidden SNPNs" which is, if the MS supports access to an SNPN using credentials from a credentials holder, associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription, if:

a) there is a successful LR after a subsequent manual selection of the SNPN;

b) the MS is configured to use timer T3245 and timer T3245 expires;

c) the MS is not configured to use timer T3245, the timer T3247 expires and the value of the SNPN-specific attempt counter for that SNPN is less than the MS implementation specific maximum value as defined in 3GPP TS 24.501 [64];

d) an entry of the "list of subscriber data" with the subscribed SNPN identity identifying the SNPN is updated or the USIM is removed if:

- EAP based primary authentication and key agreement procedure using EAP-AKA'; or

- 5G AKA based primary authentication and key agreement procedure;

 was performed in the selected SNPN; or

e) the selected entry of the "list of subscriber data" is updated or USIM is removed for the selected PLMN subscription.

When the MS reselects to a cell in a shared network, and the cell is a suitable cell for multiple SNPN identities received in the broadcast information as specified in 3GPP TS 38.331 [65], the AS indicates these multiple SNPN identities to the NAS according to 3GPP TS 38.304 [61]. The MS shall select one of these SNPNs. If the registered SNPN is available among these SNPNs, the MS shall not select a different SNPN.

The MS operating in SNPN access mode shall maintain one or more lists of "5GS forbidden tracking areas for roaming", each associated with an SNPN and, if the MS supports access to an SNPN using credentials from a credentials holder, entry of the "list of subscriber data" or the PLMN subscription. The MS shall use the list of "5GS forbidden tracking areas for roaming" associated with the selected SNPN and, if the MS supports access to an SNPN using credentials from a credentials holder, the selected entry of the "list of subscriber data" or the selected PLMN subscription. If the MS selects a new SNPN, the MS shall keep the list of "5GS forbidden tracking areas for roaming" associated with the previously selected SNPN and, if the MS supports access to an SNPN using credentials from a credentials holder, the selected entry of the "list of subscriber data" or the selected PLMN subscription. If the number of the lists to be kept is higher than supported, the MS shall delete the oldest stored list of "5GS forbidden tracking areas for roaming". The MS shall delete all lists of "5GS forbidden tracking areas for roaming", when the MS is switched off and periodically (with period in the range 12 to 24 hours). The MS shall delete the list of "5GS forbidden tracking areas for roaming" associated with an SNPN:

a) when the entry with the subscribed SNPN identifying the SNPN in the "list of subscriber data" is updated;

b) when the USIM is removed if:

- the EAP based primary authentication and key agreement procedure using the EAP-AKA'; or

- the 5G AKA based primary authentication and key agreement procedure;

 was performed in the selected SNPN; or

c) if the MS supports access to an SNPN using credentials from a credentials holder, when the list of "5GS forbidden tracking areas for roaming" is associated with:

- the entry of the "list of subscriber data" and the entry of the "list of subscriber data" is updated; or

- the PLMN subscription and USIM is removed.

NOTE 11: The number of the lists of "5GS forbidden tracking areas for roaming" supported by the MS is MS implementation specific.

If a message with cause value #15 (see 3GPP TS 24.501 [64]) is received by an MS operating in SNPN access mode, the TA is added to the list of "5GS forbidden tracking areas for roaming" of the selected SNPN and, if the UE supports access to an SNPN using credentials from a credentials holder, the selected entry of the "list of subscriber data" or the selected PLMN subscription,. The MS shall then search for a suitable cell in the same SNPN but belonging to a TA which is not in the "5GS forbidden tracking areas for roaming" list of the selected SNPN and, if the UE supports access to an SNPN using credentials from a credentials holder, the selected entry of the "list of subscriber data" or the selected PLMN subscription.

The MS should maintain a list of SNPNs for which the N1 mode capability was disabled due to receipt of a reject from the network with 5GMM cause #27 "N1 mode not allowed". When the MS disables its N1 mode capability due to receipt of a reject from an SNPN with 5GMM cause #27 "N1 mode not allowed":

- the MS should add the SNPN identity of the SNPN which sent a reject with 5GMM cause #27 "N1 mode not allowed" to the list of SNPNs for which the N1 mode capability was disabled and should start timer TJ if timer TJ is not already running. The number of SNPNs for which the N1 mode capability was disabled that the MS can store is implementation specific, but it shall be at least one. The value of timer TJ is MS implementation specific;

- in automatic SNPN selection, the MS shall not select an SNPN for which the N1 mode capability was disabled as SNPN selection candidates, unless no other SNPN is available;

- if the MS is not configured to use timer T3245, the MS maintains a list of SNPN-specific attempt counters for 3GPP access as specified in 3GPP TS 24.501 [64], and T3247 expires, then the MS removes for each SNPN-specific attempt counter for 3GPP access that has a value greater than zero and less than the MS implementation-specific maximum value the respective SNPN from the list of SNPNs for which the N1 mode capability was disabled, as specified in clause 5.3.20.3 in 3GPP TS 24.501 [64]; and

- the MS shall delete stored information on SNPNs for which the N1 mode capability was disabled when the MS is switched off, the USIM is removed, the entries of the "list of subscriber data" for the SNPNs are updated, or timer TJ expires.

NOTE 12: The expiry of timer TJ does not cause a reset of the SNPN-specific attempt counters for 3GPP access (see 3GPP TS 24.501 [64]).

If the MS does not support access to an SNPN using credentials from a credentials holder, the MS should maintain a list of SNPNs where the N1 mode capability was disabled due to IMS voice not available and the MS's usage setting was "voice centric". If the MS supports access to an SNPN using credentials from a credentials holder, the MS should maintain one or more lists of SNPNs where the N1 mode capability was disabled due to IMS voice not available and the MS's usage setting was "voice centric", each associated with selected entry of the "list of subscriber data" or the PLMN subscription. When the MS disables its N1 mode capability due to IMS voice not available and the MS's usage setting was "voice centric":

- the MS should add the SNPN identity of the SNPN to the list of SNPNs where voice service was not possible in N1 mode and should start timer TK if timer TK is not already running. The number of SNPNs that the MS can store where voice services is not possible is implementation specific, but it shall be at least one. The value of timer TK is MS implementation specific;

- in automatic SNPN selection the MS shall not consider SNPNs where voice service was not possible in N1 mode as SNPN selection candidates, unless no other SNPN is available; and

- the MS shall delete stored information on SNPNs where voice service was not possible in N1 mode when the MS is switched off, the USIM is removed, the entries of the "list of subscriber data" for the SNPNs are updated, or timer TK expires.

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

##### 4.9.3.1.4 Manual SNPN selection mode procedure for onboarding services in SNPN

The MS indicates to upper layers one or more SNPNs, which are available and indicate that onboarding is allowed. These include SNPNs in the list of "permanently forbidden SNPNs" for onboarding services and the list of "temporarily forbidden SNPNs" for onboarding services. The MS may indicate to the user whether the available SNPNs are present in the list of "temporarily forbidden SNPNs" or the list of "permanently forbidden SNPNs".

The MS shall limit its search for the SNPN to the NG-RAN access technology.

Editor's note: (WI: eNPN, CR#0711) further details on manual SNPN selection mode procedure for onboarding services are FFS.