**3GPP TSG-CT WG1 Meeting #141eC1-23XXXX**

**Online 17– 21 April 2023**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  |  | **CR** | **1076** | **rev** | **3** | **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 |  |

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| ***Title:*** | SOR related information in list of subscriber data for SNPN | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Samsung, Ericsson | | | | | | | | | |
| ***Source to TSG:*** | C1 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | TEI18 | | | | |  | ***Date:*** | | | 2023-04-10 |
|  |  | | | |  | |  | | |  |
| ***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 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-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | In this TS, in annex C.1.2 it is mentioned:  *TS 23.122*  *The HPLMN or subscribed SNPN can configure their subscribed UEs' SNPN configuration parameters associated with the PLMN subscription or the selected entry of the "list of subscriber data", respectively, to expect to receive the steering of roaming information due to initial registration in a non-subscribed SNPN.*  But this information is not captured in the entry of "list of subscriber data" in the UE. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Adding information element that the HPLMN or subscribed SNPN can send the steering of roaming information due to initial registration in a non-subscribed, fpr the selected entry of the "list of subscriber data". | | | | | | | | |
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| ***Consequences if not approved:*** | | Impact in receiving SOR-SNPN-SI and/ or SOR-SNPN-SI-LS information from HPLMN/ subscribed SNPN. | | | | | | | | |
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| ***Clauses affected:*** | | 4.9.3.0 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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 change \*\*\*\*\*

#### 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 subscribed 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 subscribed 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 subscribed 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.

If the MS supports access to an SNPN using credentials from a credentials holder, the credentials can include an indication to use MSK for derivation of KAUSF after success of primary authentication and key agreement procedure;

NOTE 3: Credentials are available in USIM if the subscribed 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. If the MS supports access to an SNPN using credentials from a credentials holder, credentials available in USIM can include an indication to use MSK for derivation of KAUSF after success of primary authentication and key agreement procedure.

ba) optionally, a routing indicator, except when the subscribed 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 3A: Routing indicator is available in USIM if the subscribed 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.

bb) optionally, the protection scheme identifier as specified in 3GPP TS 33.501 [66], except when the subscribed 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;

If the protection scheme identifier is configured in the entry of the "list of subscriber data" and not set to "null-scheme", the entry of the "list of subscriber data" also contains the home network public key and the home network public key identifier as specified in in 3GPP TS 33.501 [66];

NOTE 3B: The protection scheme identifier, the home network public key and the home network public key identifier are available in USIM if the subscribed 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, when the MS accesses an SNPN using the entry.

Access identity 11 or 15, if configured, is applicable for the MS only in the subscribed SNPN.

Access identity 12, 13 or 14, if configured, is applicable for the MS only:

1) in the subscribed SNPN; and

2) if the MCC of the SNPN identity of the subscribed SNPN is not the MCC of value 999, in the non-subscribed SNPNs of the same country as the subscribed SNPN;

Access identity 1 or 2, if configured, is applicable for the MS only:

1) in the subscribed SNPN;

2) if the MCC of the SNPN identity of the subscribed SNPN is not the MCC of value 999, in the non-subscribed SNPNs of the same country as the subscribed SNPN; and

3) in an SNPN equivalent to the subscribed SNPN;

e) zero or more sets of pre-configured URSP rules (see 3GPP TS 24.526 [77]), each set for the subscribed SNPN or a non-subscribed SNPN;

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:

1) the SNPN selection parameters, consisting of:

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

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

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

iv) optionally, if the MS supports access to an SNPN providing access for localized services in SNPN, the SNPN selection parameters for access for localized services in SNPN, consisting of:

A) a "credentials holder controlled prioritized list of preferred SNPNs for access for localized services in SNPN", where each entry contains an SNPN identity and a validity information consisting of time validity information; and

B) a "credentials holder controlled prioritized list of preferred GINs for access for localized services in SNPN", where each entry contains an GIN and a validity information consisting of time validity information; and

2) optionally, an indication to expect to receive the steering of roaming information due to initial registration in a non-subscribed SNPN;

Editor's note: (WI: eNPN\_Ph2, CR 1029) location validity information is FFS.

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 subscribed 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;

NOTE 9: The ME can be configured with an indication to use anonymous SUCI associated with an entry of "list of subscriber data" when the EAP method associated with the credentials of the entry supports SUPI privacy at the EAP layer.

NOTE 10: Anonymous SUCI is not used if the subscribed SNPN of the entry 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.

The MS which supports onboarding services in SNPN shall be pre-configured with default UE credentials for primary authentication and may be pre-configured with onboarding SNPN selection information. Contents of the onboarding SNPN selection information are MS implementation specific. Contents of default UE credentials for primary authentication 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;

c) a credentials holder controlled prioritized list of GINs;and

d) optionally, if the MS supports access to an SNPN providing access for localized services in SNPN, with the following SNPN selection parameters for access for localized services in SNPN associated with the PLMN subscription, consisting of:

1) a "credentials holder controlled prioritized list of preferred SNPNs for access for localized services in SNPN", where each entry contains an SNPN identity and a validity information consisting of time validity information; and

2) a "credentials holder controlled prioritized list of preferred GINs for access for localized services in SNPN", where each entry contains an GIN and a validity information consisting of time validity information;

Editor's note: (WI: eNPN\_Ph2, CR 1029) location validity information is FFS.

and with the following configuration parameters associated with the PLMN subscription:

a) zero or more sets of pre-configured URSP rules (see 3GPP TS 24.526 [77]), each set for the HPLMN or a non-subscribed SNPN;and

b) optionally, an indication to expect to receive the steering of roaming information due to initial registration in a non-subscribed SNPN.

NOTE 11: 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 12: 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 SNPN is of the same country as the HPLMN, then the configured access identity 1, 2, 12, 13, or 14 is applicable for the MS.

NOTE 13: If an MS accesses an SNPN using the PLMN subscription, an indication of whether the MS shall ignore all warning messages in an SNPN is configured in the USIM of the MS.

NOTE 14: Handling of URSP rules is specified in 3GPP TS 24.526 [77].

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, equivalent SNPNs or both, 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”. 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 the PLMN subscription, If the MS supports access to an SNPN using credentials from a credentials holder, equivalent SNPNs or both, the MS 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" (for onboarding services, if the MS is registered for onboarding services in SNPN or performing initial registration for onboarding services in SNPN) which is, if the MS supports access to an SNPN using credentials from a credentials holder, equivalent SNPNs or both 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" (for onboarding services, if the MS is registered for onboarding services in SNPN or performing initial registration for onboarding services in SNPN) which is, if the MS supports access to an SNPN using credentials from a credentials holder, equivalent SNPNs or both, 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" (for onboarding services, if the MS is registered for onboarding services in SNPN or performing initial registration for onboarding services in SNPN) which is, if the MS supports access to an SNPN using credentials from a credentials holder, equivalent SNPNs or both, 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" (for onboarding services, if the MS is registered for onboarding services in SNPN or performing initial registration for onboarding services in SNPN) which is, if the MS supports access to an SNPN using credentials from a credentials holder, equivalent SNPNs or both, 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, equivalent SNPNs or both, entry of the "list of subscriber data" or, if the MS supports access to an SNPN using credentials from a credentials holder, 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, equivalent SNPNs or both, 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, equivalent SNPNs or both, 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, equivalent SNPNs or both, 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 15: 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, equivalent SNPNs or both, 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, equivalent SNPNs or both, 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 16: 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 and does not support equivalent SNPNs, the MS should maintain a list of SNPNs where the N1 mode capability was disabled because IMS voice was 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, equivalent SNPNs or both the MS should maintain one or more lists of SNPNs where the N1 mode capability was disabled because IMS voice was not available and the MS's usage setting was "voice centric", each associated with an entry of the "list of subscriber data". If the MS supports 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 because IMS voice was not available and the MS's usage setting was "voice centric", associated with the PLMN subscription. If the MS supports access to an SNPN using credentials from a credentials holder, equivalent SNPNs or both, the MS shall use the lists associated with the selected entry of the "list of subscriber data" or the selected 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.

The MS may support equivalent SNPNs. If the MS supports equivalent SNPNs, the ME shall store up to one list of equivalent SNPNs:

- per entry of "list of subscriber data"; or

- per the PLMN subscription, if the MS supports access to an SNPN using credentials from a credentials holder.

SNPNs in the list of equivalent SNPNs associated with the selected entry of "list of subscriber data" or the selected PLMN subscription shall be regarded by the MS as equivalent to each other for SNPN selection, cell selection, and cell re-selection. The list of equivalent SNPNs associated with the selected entry of "list of subscriber data" or the selected PLMN subscription is created, replaced or deleted at the end of each registration procedure. The stored list consists of a list of equivalent SNPNs as provided by the network plus the SNPN identity of the registered SNPN that provided the list. When the MS is switched off, the MS shall keep the stored list(s) so that they can be used for SNPN selection after switch on. The MS shall delete the stored list associated with an entry of "list of subscriber data" or the PLMN subscription, when the USIM is removed, the associated entry of "list of subscriber data" is updated, or the MS registered for emergency services deregisters.

NOTE x: The MS can provide the list of equivalent SNPNs associated with the selected entry of "list of subscriber data" or the selected PLMN subscription to the lower layers.

Editor's note: (WI: eNPN\_Ph2, CR: 1003) when the MS is registering or is registered for onboarding services in SNPN, it is FFS whether list of equivalent SNPNs is needed.

##### \*\*\*\*\* End of changes \*\*\*\*\*