**3GPP TSG-CT WG1 Meeting #137-eC1-224887**

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

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| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
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|  | **23.122** | **CR** | **0964** | **rev** | **-** | **Current version:** | **17.7.1** |  |
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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:***  | Perform automatic network selection in SNPN access mode  |
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| ***Source to WG:*** | Huawei, HiSilicon |
| ***Source to TSG:*** | C1 |
|  |  |
| ***Work item code:*** | eNPN |  | ***Date:*** | 2022-08-10 |
|  |  |  |  |  |
| ***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 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:*** | Two agreed CR C1-224035 and C1-223061 specified for clause C.3(Stage-2 flow for steering of UE in HPLMN or VPLMN after registration) that:If the security check is not successful, and 1. If the UE has stored SOR-CMCI, and there are ongoing PDU session or service, the UE shall apply the actions in clause 4.2;
2. If the UE has stored SOR-CMCI, and there are no ongoing PDU session or service, the UE shall release the N1 NAS signalling locally;
3. If the UE has no stored SOR-CMCI, and there are ongoing PDU session or service, the UE shall wait to be idle mode or connected with RRC inactive;
4. If the UE has no stored SOR-CMCI, and there are no ongoing PDU session or service, the UE shall release the N1 NAS signalling locally.

The behaviour shall also apply when the UE works in SNPN access mode. |
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| ***Summary of change:*** | Correct on clause C.6(Stage-2 flow for steering of UE in SNPN after registration) to be aligned with C.3 |
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| ***Consequences if not approved:*** | Clause C.6 is not aligned with C.3 |
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| ***Clauses affected:*** | C.6 |
|  |  |
|  | **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:*** |  |

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

# C.6 Stage-2 flow for steering of UE in SNPN after registration

The stage-2 flow for the steering of UE in SNPN after registration is indicated in figure C.6.1. The UE is registered on an SNPN which can be the subscribed SNPN or a non-subscribed SNPN. The AMF is located in the selected SNPN. The UDM is located in the HPLMN or subscribed SNPN.

The procedure is triggered:

- If the UDM supports obtaining SOR-SNPN-SI and SOR-CMCI, if any, from the SOR-AF, the subscribed SNPN or HPLMN policy for the SOR-AF invocation is present in the UDM and the SOR-AF provides the UDM with SOR-SNPN-SI for a UE identified by SUPI. If the ME supports the SOR-CMCI, the SOR-AF may provide the SOR-CMCI and optionally provides the "Store the SOR-CMCI in the ME" indicator otherwise the SOR-AF shall provide neither the SOR-CMCI nor the "Store the SOR-CMCI in the ME" indicator; or

NOTE 0: The SOR-AF can determine that the ME supports SOR-SNPN-SI if the Nsoraf\_SoR\_Info service operation has returned the "ME support of SOR-SNPN-SI" indicator. The UDM determines that the ME supports SOR-SNPN-SI if the UE is in a non-subscribed SNPN or the UE is a subscribed SNPN and the AMF has indicated to the UDM that the UE supports SOR-SNPN-SI.

NOTE 1: The SOR-AF can determine that the ME supports the SOR-CMCI if the Nsoraf\_SoR\_Info service operation has returned the "ME support of SOR-CMCI" indicator. How the SOR-AF determines that the USIM for the indicated SUPI supports SOR-CMCI is implementation specific.

- When a SOR-SNPN-SI becomes available in the UDM (i.e. retrieved from the UDR). If the "ME support of SOR-CMCI" indicator is stored for the UE, the HPLMN UDM shall obtain the SOR-CMCI and the "Store the SOR-CMCI in the ME" indicator, if available, otherwise the HPLMN UDM shall obtain neither the SOR-CMCI nor the "Store the SOR-CMCI in the ME" indicator.

NOTE 2: Before providing the UDM with SOR-SNPN-SI for a UE identified by SUPI, the SOR-AF, based on subscribed SNPN or HPLMN policies or criteria, can obtain the user location information by triggering the unified location service exposure procedure as defined in 3GPP TS 23.273 [70] clause 6.5, or additionally based on implementation specific criteria, by requesting the UE location information from other application function using implementation specific method. This user location information can then be used in the SOR-AF algorithms.

NOTE 3: Before providing the UDM with a new SOR-SNPN-SI for a UE identified by SUPI, the SOR-AF, based on subscribed SNPN or HPLMN policies or criteria, can obtain the user location information by triggering the unified location service exposure procedure as defined in 3GPP TS 23.273 [70] clause 6.5, or additionally based on implementation specific criteria, by requesting the UE location information from other application function using implementation specific method. This user location information can then be used in the SOR-AF algorithms.

Figure C.6.1: Procedure for providing SOR-SNPN-SI after registration

For the steps below, security protection is described in 3GPP TS 33.501 [24].

0) The SOR-AF to the UDM: Nudm\_ParameterProvision\_Update request is sent to the UDM to trigger the update of the UE with the SOR-SNPN-SI, the SOR-CMCI, if any, and the "Store the SOR-CMCI in the ME" indicator, if any, for a UE identified by SUPI.

1) The UDM to the AMF: The UDM notifies the changes of the user profile to the affected AMF by the means of invoking Nudm\_SDM\_Notification service operation. The Nudm\_SDM\_Notification service operation contains the steering of roaming information that needs to be delivered transparently to the UE over NAS within the Access and Mobility Subscription data. If the subcribed SNPN or HPLMN decided that the UE is to acknowledge successful security check of the received steering of roaming information, the Nudm\_SDM\_Notification service operation also contains an indication that the UDM requests an acknowledgement from the UE as part of the steering of roaming information. If the SOR-CMCI was obtained, the UDM shall include the SOR-CMCI into the steering of roaming information and shall requests an acknowledgement from the UE as part of the steering of roaming information. If the "Store the SOR-CMCI in the ME" indicator was obtained, the HPLMN UDM shall include the "Store the SOR-CMCI in the ME" indicator;

NOTE 4: The UDM cannot provide the SOR-SNPN-SI or SOR-CMCI to the AMF which does not support receiving SOR transparent container (see 3GPP TS 29.503 [78]).

2) The AMF to the UE: the AMF sends a DL NAS TRANSPORT message to the served UE. The AMF includes in the DL NAS TRANSPORT message the steering of roaming information received from the UDM.

3) Upon receiving the steering of roaming information, the UE shall perform a security check on the steering of roaming information included in the DL NAS TRANSPORT message to verify that the steering of roaming information is provided by the subcribed SNPN or HPLMN, and

- if the security check is successful, then:

a) if the steering of roaming information contains the SOR-SNPN-SI, the ME shall replace the credentials holder controlled prioritized lists of preferred SNPNs for the selected entry of the "list of subscriber data" or the selected PLMN subscription with the received credentials holder controlled prioritized lists of preferred SNPNs, if any, the ME shall replace the credentials holder controlled prioritized lists of GINs for the selected entry of the "list of subscriber data" or the selected PLMN subscription with the received credentials holder controlled prioritized lists of GINs, if any, and the ME shall delete the SNPNs identified by the credentials holder controlled prioritized lists of preferred SNPNs or credentials holder controlled prioritized lists of GINs from the list of "temporarily forbidden SNPNs" and the list of "permanently forbidden SNPNs", if they are present in these lists.

 If the UDM has requested an acknowledgement from the UE in the DL NAS TRANSPORT message, the UE sends an UL NAS TRANSPORT message to the serving AMF with an SOR transparent container including the UE acknowledgement and the UE shall set the "ME support of SOR-CMCI" indicator to "supported".

 If the UE is in automatic network selection mode, the selected SNPN is a non-subscribed SNPN and the UE decides to perform SNPN selection, then:

- if the UE is configured with the SOR-CMCI or received the SOR-CMCI over N1 NAS signalling, the UE shall apply the actions in clause C.4; or

- the UE shall wait until it moves to idle mode or 5GMM-CONNECTED mode with RRC inactive indication (see 3GPP TS 24.501 [64]) before attempting to obtain service on a higher priority SNPN as specified in clause 4.9.3.

 If the selected SNPN is a non-subscribed SNPN and the UE has an established emergency PDU session then the UE may attempt to perform the SNPN selection subsequently after the emergency PDU session is released, if the UE is in automatic network selection mode.

If the UDM has not requested an acknowledgement from the UE, then steps 4 is skipped; and

- If the selected SNPN is a non-subscribed SNPN, the security check is not successful and the UE is in automatic network selection mode, then:

- if the UE has a SOR-CMCI stored in the non-volatile memory of the ME, then:

- if there are ongoing PDU sessions or services, the UE shall apply the actions in clause C.4.2, and the current SNPN is considered as lowest priority; or

- if there are no ongoing PDU sessions or services, the UE shall release the current N1 NAS signalling connection locally and attempt to obtain service on a higher priority SNPN as specified in clause 4.9.3, with an exception that the current SNPN is considered as lowest priority;

- if the UE does not have a SOR-CMCI stored in the non-volatile memory of the ME, then:

- if there are ongoing PDU sessions or services, the UE shall wait until it moves to idle mode or 5GMM-CONNECTED mode with RRC inactive indication (see 3GPP TS 24.501 [64]) before attempting to obtain service on a higher priority SNPN as specified in clause 4.9.3, with an exception that the current SNPN is considered as lowest priority. If the selected SNPN is a non-subscribed SNPN and the UE has an established emergency PDU session, then the UE shall attempt to perform the SNPN selection after the emergency PDU session is released; or

- if there are no ongoing PDU sessions or services, the UE shall release the current N1 NAS signalling connection locally and attempt to obtain service on a higher priority SNPN as specified in clause 4.9.3, with an exception that the current SNPN is considered as lowest priority.

If the UDM has not requested an acknowledgement from the UE, then step 4 is skipped;

NOTE 5: When the UE is in the manual mode of operation and the current chosen non-subscribed SNPN is part of the user controlled prioritized list of preferred SNPNs, the UE stays on the current chosen non-subscribed SNPN.

4) The AMF to the UDM: If the UL NAS TRANSPORT message with an SOR transparent container is received, the AMF uses the Nudm\_SDM\_Info service operation to provide the received SOR transparent container to the UDM. If the subcribed SNPN or HPLMN decided that the UE is to acknowledge successful security check of the received steering of roaming information in step 1, the UDM verifies that the acknowledgement is provided by the UE. If the "ME support of SOR-CMCI" indicator in the header of the SOR transparent container is set to "supported", then the HPLMN UDM shall store the "ME support of SOR-CMCI" indicator, otherwise the HPLMN UDM shall delete the stored "ME support of SOR-CMCI" indicator, if any.

 If the present flow was invoked by the UDM after receiving from the SOR-AF the SOR-SNPN-SI, SOR-CMCI, if any, for a UE identified by SUPI using an Nudm\_ParameterProvision\_Update request, and the UDM verification of the UE acknowledgement is successful, then the UDM informs the SOR-AF about successful delivery of the SOR-SNPN-SI, SOR-CMCI, if any, using Nsoraf\_SoR\_Info (SUPI of the UE, successful delivery); and

5) The UDM to the SOR-AF: Nsoraf\_SoR\_Info (SUPI of the UE, successful delivery, "ME support of SOR-CMCI" indicator, if any). If the subscribed SNPN or HPLMN policy for the SOR-AF invocation is present and the UDM received and verified the UE acknowledgement in step 5, then the UDM informs the SOR-AF about successful delivery of the SOR-SNPN-SI, SOR-CMCI, if any, to the UE. If the "ME support of SOR-CMCI" indicator is stored for the UE, the HPLMN UDM shall include the "ME support of SOR-CMCI" indicator;

If the selected SNPN is a non-subscribed SNPN and:

- the UE in manual mode of operation encounters security check failure of SOR information in DL NAS TRANSPORT message; and

- upon switching to automatic network selection mode, the UE remembers that it is still registered on the where the security check failure of SOR information was encountered;

the UE shall wait until it moves to idle mode or 5GMM-CONNECTED mode with RRC inactive indication (see 3GPP TS 24.501 [64]) before attempting to obtain service on a higher priority SNPN as specified in clause 4.9.3, with an exception that the current registered SNPN is considered as lowest priority. If the selected SNPN is a non-subscribed SNPN and the UE has an established emergency PDU session, then the UE shall attempt to perform the SNPN selection after the emergency PDU session is released.

NOTE 6: The receipt of the steering of roaming information by itself does not trigger the release of the emergency PDU session.

NOTE 7: If the selected SNPN is the subscribed SNPN, regardless of whether the UE is in automatic network selection mode or manual network selection mode, regardless of whether the UE has an established emergency PDU session or not, and regardless of whether the security check is successful or not successful, the UE is not required to perform the SNPN selection.

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