**3GPP TSG-WG SA2 Meeting #162S2-240xxxx**

**15 – 19 April 2024, Changsha, CN (revision of S2-2402027)**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **23.502** | **CR** | **-** | **rev** | **-** | **Current version:** | **18.5.0** |  |
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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 |  | Radio Access Network |  | Core Network | **x** |

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| ***Title:*** | Indirect Network Sharing with enhancement of SMF selection | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Ericsson, China Unicom, Tencent, Tencent Cloud, Nokia, Nokia Shanghai Bell, vivo, OPPO | | | | | | | | | |
| ***Source to TSG:*** | SA2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | TEI19\_NetShare | | | | |  | ***Date:*** | | | 2024-04-05 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | B |  | | | | | ***Release:*** | | | Rel-19 |
|  | *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)* | |
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| ***Reason for change:*** | | Based on the approved TEI19 WI paper of SP-240488, the corresponding objective “The AMF impacts to support enhanced NF selection function as appropriate, including taking into account location aspects of the UE. For example, the SMF selection (i.e., the AMF of hosting operator selects the SMF of participating operator) during the PDU session establishment procedure needs to be evaluated considering the location aspects of the UE.” needs to be specified. | | | | | | | | |
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| ***Summary of change:*** | | The SMF selection considering the UE location information is specified in the SMF selection procedure for Home Routed roaming scenario. | | | | | | | | |
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| ***Consequences if not approved:*** | | This new network sharing mechanism cannot be specified and the corresponding operator requirements cannot be satisfied. | | | | | | | | |
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| ***Clauses affected:*** | | 4.3.2.2.3.3 | | | | | | | | |
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|  | | **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 \* \* \* \*

4.3.2.2.3.3 Home routed roaming

The selection of the SMF in VPLMN is performed in the same way as for non-roaming and roaming with local breakout (see clause 4.3.2.2.3.2). The selection of the SMF in HPLMN, including the case of the Indirect Network Sharing scenario as described in clause 5.18 and clause 6.3.2 of TS 23.501[2], is performed by means of one of two main options. Which of these two options to use is decided based on Service Level Agreements between the operators.

NOTE 1: The procedures described in this clause are not limited to SMF selection but can be used to discover and select any NF/NF service in the HPLMN part of a Network Slice instance.

In the first option, requiring the use of NSSF in both the VPLMN and the HPLMN, the selection of the SMF in HPLMN is performed by means of the procedure depicted in Figure 4.3.2.2.3.3-1.



Figure 4.3.2.2.3.3-1: Option 1 for SMF selection for home-routed roaming scenarios

1. Based on the operator's configuration, if the AMF is not aware of the appropriate NRF to be used to select NFs/services in the HPLMN, the AMF invokes the Nnssf\_NSSelection\_Get service operation from the NSSF in VPLMN with the VPLMN S-NSSAI from the Allowed NSSAI or Partially Allowed NSSAI requested by the UE for this PDU Session, the HPLMN S-NSSAI that maps to the VPLMN S-NSSAI, PLMN ID of the SUPI, the TAI of the UE and the indication that the request is within a procedure of PDU Session establishment in the home-routed roaming scenario.

2. If slicing configuration information for the S-NSSAI in the HPLMN is not available (e.g. the NSSF has no cached information), the NSSF of the VPLMN invokes the Nnssf\_NSSelection\_Get service operation from NSSF of the HPLMN according to the PLMN ID of SUPI by including the HPLMN S-NSSAI.

3. The NSSF in HPLMN may include the NSI ID, if needed, for the Network Slice instance in HPLMN selected for the corresponding S-NSSAI of the HPLMN in the Nnssf\_NSSelection\_Get response. The NSSF in HPLMN also includes the appropriate hNRF to be used to select NFs/services within HPLMN in the Nnssf\_NSSelection\_Get response.

4. The serving NSSF includes in the Nnssf\_NSSelection\_Get response all the information that has been received from the NSSF in HPLMN when responding to the AMF.

5. The AMF queries the target vNRF using the Nnrf\_NFDiscovery\_Request by including PLMN ID of the SUPI, the serving PLMN ID, DNN, HPLMN S-NSSAI, the hNRF and possibly an HPLMN NSI ID for the selected Network Slice instance corresponding to the HPLMN S-NSSAI if available in the AMF (obtained from the HPLMN NSSF in steps 3 and 4 or cached from a previous H-NSSF query).

In case of Indirect Network Sharing, the AMF may also include e.g. following query parameters, the service area/serving scope/preferred locality of SMF based on UE location as described in clause 6.3.2 of TS 23.501 [2].

6. The NRF in serving PLMN identifies NRF in HPLMN (hNRF) based on the information provided by the NSSF in the serving PLMN and it invokes the Nnrf\_NFDiscovery\_Request service from hNRF according the procedure in Figure 4.17.4-1 to get the expected SMF instance(s) deployed in the HPLMN. As the vNRF in VPLMN triggers the "NF Discovery" on behalf of the AMF, the NRF in the VPLMN shall not replace the information of the NF, i.e. AMF ID, in the Nnrf\_NFDiscovery\_Request message it sends to the hNRF.

7-8. The hNRF provides to the AMF, via vNRF, the information e.g. FQDN or IP address, of a set of the SMF instance(s) in Nnrf\_NFDiscovery\_Request response message and possibly an NSI ID for the selected Network Slice instance corresponding to the S-NSSAI of the HPLMN for subsequent NRF queries.

When the NSSF is not deployed in HPLMN then the AMF in VPLMN relies on either the configuration to obtain the NRF in HPLMN or on the option below.

The second option for the selection of the SMF in HPLMN is performed by means of the procedure depicted in Figure 4.3.2.2.3.3-2.



Figure 4.3.2.2.3.3-2: Option 2 for SMF selection for home-routed roaming scenarios

1. Based on the operator's configuration, the AMF queries the vNRF with PLMN ID of the SUPI, PLMN ID of the serving PLMN, DNN, the HPLMN S-NSSAI that maps to the S-NSSAI from the Allowed NSSAI or Partially Allowed NSSAI of the Serving PLMN the UE has requested, the hNRF and if applicable and available, an HPLMN NSI ID (if the AMF has stored an hNRF and if applicable and available, an HPLMN NSI ID for the selected Network Slice instance corresponding to the S-NSSAI of the HPLMN) and DNN.

In case of Indirect Network Sharing, the AMF may also include e.g. following query parameters, service area/serving scope/preferred locality of SMF based on UE location as described in clause 6.3.2 of TS 23.501 [2].

2. The vNRF queries, on behalf of the AMF in VPLMN, the hNRF identified by means of the PLMN ID of the SUPI (if no hNRF is received from the AMF, the hNRF is locally determined in the vNRF based on information received in step 1). The NRF in VPLMN requests "NF Discovery" service from hNRF according the procedure in Figure 4.17.4-1 to get the expected SMF instance(s) deployed in the HPLMN. As the NRF in the serving PLMN triggers the "NF Discovery" on behalf of the AMF, the NRF in the VPLMN shall not replace the information of the NF, i.e. AMF ID, in the Nnrf\_NFDiscovery\_Request message it sends to the hNRF.

Depending on the available information and based on configuration, the hNRF may either execute steps in 3(A) or in 3(B).

3(A) The hNRF provides to the AMF, via vNRF, the information e.g. FQDN or IP address, of a set of the discovered SMF instance(s) and possibly an NSI ID for the selected HPLMN part of the Network Slice instance corresponding to the S-NSSAI of the HPLMN for subsequent NRF queries in Nnrf\_NFDiscovery\_Request response message(steps 3a and 3b).

3(B) The hNRF queries, on behalf of the AMF, an appropriate local NRF in HPLMN (e.g. a slice level NRF); this local NRF provides the IP address or the FQDN of expected SMF instance(s) and possibly an NSI ID for the selected HPLMN part of the Network Slice instance corresponding to the S-NSSAI of the HPLMN for subsequent NRF queries (steps 3a and 3b) that the hNRF returns, via vNRF, to the AMF (steps 3c and 3d).

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