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

**April 15th – 19th, 2024, Changshan, China**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **23.501** | **CR** |  | **rev** |  | **Current version:** | **18.5.0** |  |
|  | | | | | | | | |
| *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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X

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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network | **X** |

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| ***Title:*** | Minimize number of UE and AM Policy Associations | | | | | | | | | |
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| ***Source to WG:*** | Ericsson, AT&T, Verizon, Oracle | | | | | | | | | |
| ***Source to TSG:*** | SA2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | TEI19\_MINPA | | | | |  | ***Date:*** | | | 2024-04-15 |
|  |  | | | |  | |  | | |  |
| ***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:*** | | A UE that is registered to AMF, no UE Policy or no AM Policy is established to the PCF then later, a change of Access and Mobility Subscription Data may be provided to the AMF to enable the UE or AM Policy Association to be established, according to 23.501 it is possible to use PCF Selection Assistance Information as an input to select the same PCF as already selected for a PDU Session, however the example includes EPS Interworking only. Here, the proposal is to remove the example so that the PCF Selection Assistance Info is also used in case the AMF selects a PCF when the SMF has already selected one PCF. | | | | | | | | |
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| ***Summary of change:*** | | Remove EPS interworking as the only example when the AMF uses PCF Selection Assistance Info to select the PCF serving a UE. | | | | | | | | |
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| ***Consequences if not approved:*** | | Not possible to select the same PCF serving the UE and serving each of the PDU Sessions when the PCF serving the PDU Session is already selected. | | | | | | | | |
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| ***Clauses affected:*** | | 6.3.7.1 | | | | | | | | |
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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 \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

#### 6.3.7.1 PCF discovery and selection for a UE or a PDU Session

PCF discovery and selection functionality is implemented in AMF, SMF, SCP and PCF and follows the principles in clause 6.3.1. The AMF uses the PCF services for a UE and the SMF uses the PCF services for a PDU Session. PCF for a PDU Session uses the PCF services for a UE.

When the NF service consumer performs discovery and selection for a UE, the following applies:

- The AMF may utilize the NRF to discover the candidate PCF instance(s) for a UE. In addition, PCF information may also be locally configured in the AMF. The AMF selects a PCF instance based on the available PCF instances obtained from the NRF or locally configured information in the AMF, depending on operator's policies.

In the non roaming case, the AMF selects a PCF instance for AM policy association and selects the same PCF instance for UE policy association. In the roaming case, the AMF selects a V-PCF instance for AM policy association and selects the same V-PCF instance for UE policy association.

The PCF for a PDU Session selects a (V-)PCF instance for UE policy association.

The following factors may be considered at PCF discovery and selection for Access and Mobility policies and UE policies:

- SUPI; the AMF selects a PCF instance based on the SUPI range the UE's SUPI belongs to or based on the results of a discovery procedure with NRF using the UE's SUPI as input for PCF discovery.

- S-NSSAI(s). In the roaming case, the AMF selects the V-PCF instance based on the S-NSSAI(s) of the VPLMN and selects the H-PCF instance based on the S-NSSAI(s) of the HPLMN.

- PCF Set ID.

- PCF Group ID of the UE's SUPI.

NOTE 1: The AMF can infer the PCF Group ID the UE's SUPI belongs to, based on the results of PCF discovery procedures with NRF. The AMF provides the PCF Group ID the SUPI belongs to to other PCF NF consumers as described in TS 23.502 [3].

- DNN replacement capability of the PCF.

- Slice replacement capability of the PCF.

- PCF Selection Assistance Info and PCF ID(s) serving the established PDU Sessions/PDN Connections received from UDM. In case PCF Selection Assistance Info and PCF ID(s) are received from the UDM, the AMF selects the same PCF instance serving the combination of DNN and S-NSSAI as indicated by the PCF Selection Assistance Info, if multiple DNN, S-NSSAI combinations are provided, the AMF selects the DNN,S-NSSAI using local configuration. In case PCF ID(s) are not received, the AMF selects the PCF instance by considering other above factors.

- URSP delivery in EPS capability of the PCF.

When the NF service consumer performs discovery and selection for a PDU Session, the following applies:

- The SMF may utilize the NRF to discover the candidate PCF instance(s) for a PDU Session. In addition, PCF information may also be locally configured in the SMF. The SMF selects a PCF instance based on the available PCF instances obtained from the NRF or locally configured information in the SMF, depending on operator's policies.

The following factors may be considered at PCF discovery and selection for a PDU session:

a) Local operator policies.

b) Selected Data Network Name (DNN).

c) S-NSSAI of the PDU Session. In the LBO roaming case, the SMF selects the PCF instance based on the S-NSSAI of the VPLMN. In the home routed roaming case, the H-SMF selects the H-PCF instance based on the S-NSSAI of the HPLMN.

d) SUPI; the SMF selects a PCF instance based on the SUPI range the UE's SUPI belongs to or based on the results of a discovery procedure with NRF using the UE's SUPI as input for PCF discovery.

e) PCF selected by the AMF for the UE.

f) MA PDU Session capability of the PCF, for an MA PDU session.

g) The PCF Group ID provided by the AMF to the SMF.

h) PCF Set ID.

i) Same PCF Selection Indication.

j) URSP delivery in EPS capability of the PCF.

In the case of delegated discovery and selection in SCP, the SMF includes the factors b) - h), j), if available, in the first request.

The selected PCF instance for serving the UE and the selected PCF instance for serving a PDU session of this UE may be the same or may be different.

In the following scenarios, information about the PCF instance that has been selected (i.e. the PCF ID, PCF Set Id and, if PCF Set Id is not available, the PCF Group ID (if available)) may be forwarded to another NF. If the NF service consumer performs discovery and selection, this NF may use this PCF instance. If the NF service consumer performs delegated discovery and selection, this NF may include PCF ID, PCF Set Id and, if PCF Set Id is not available, the PCF Group ID (if available) in the request and the SCP may use this information to select the PCF instance (discovery may still be needed depending on what level of information is sent by the AMF, e.g. the address of the PCF instance may not be present):

When NF service consumer performs discovery and selection, the following applies:

- During AMF relocation, the target AMF may receive a PCF ID, PCF Set Id and, if PCF Set Id is not available, the PCF Group ID (if available) from the source AMF to enable the usage of the same PCF by the target AMF, and the target AMF may decide based on operator policy either to use the same PCF or select a new PCF.

- The AMF may, based on operator policies, forward the selected PCF to SMF instance(s) during the PDU Session Establishment procedure(s) to enable the usage of the same PCF for the AMF and the SMF instance(s). The SMF may decide based on operator policy either to use the same PCF or select a new PCF. If combination of the DNN and S-NSSAI of the PDU session matches one of the combination of the DNN and S-NSSAI included in the PCF Selection Assistance info received from UDM, the AMF shall forward Same PCF Selection Indication together with the selected PCF to SMF instance during the PDU Session Establishment procedure. In case that the Same PCF Selection Indication is received together with the PCF ID, the SMF shall select the same PCF instance for SM Policy Control.

- In the roaming case, the AMF may, based on operator policies, e.g. roaming agreement, select the H-PCF in addition to the V-PCF for a UE by performing the PCF discovery and selection as described above. The AMF sends the H-PCF ID of the selected H-PCF instance to the V-PCF during the policy association establishment procedure.

When the SMF receives a a redirection indication with PCF ID from the PCF for the PDU session, the SMF shall terminate the current SM Policy Control association and reselects a PCF based on the received PCF ID. The SMF shall then establish an SM Policy Control association with the reselected PCF.

In the case of delegated discovery and selection in the SCP, the following applies:

- The selected PCF instance may include the PCF Id, PCF Set Id and, if PCF Set Id is not available, the PCF Group ID (if available) in the response to the AMF.

NOTE 2: The selected (V-)PCF instance can include the binding indication, including the (V-)PCF ID and possibly PCF Set ID in the response to the AMF as described in clause 6.3.1.0.

- The AMF first establishes an AM policy association; when forwarding the related request message the SCP discovers and selects a PCF instance. Unless binding information is provided in the response to that request the SCP adds the NF function producer ID it selected, i.e. PCF ID, into the response and the AMF uses the received PCF ID and available binding information as discovery and selection parameters for the request to establish the UE policy association towards the SCP. The SCP selects the (V-)PCF instance for UE policy association based on the received discovery and selection parameters.

- During AMF relocation, the AMF may receive a PCF ID, PCF Set Id and, if PCF Set Id is not available, the PCF Group ID (if available) from the source AMF to enable the usage of the same PCF instance by the AMF. The AMF may decide based on operator policy either to use the old PCF instance or select another PCF instance. If the AMF decides to use the old PCF, the AMF includes the PCF ID PCF Set Id, and if PCF Set Id is not available, the PCF Group ID (if available) as received from the source AMF in the AM policy update request to the SCP.

- The AMF may, based on operator policies, forward the selected PCF ID, PCF Set Id and, if PCF Set Id is not available, the PCF Group ID (if available) to the SMF during the PDU Session Establishment procedure to enable the usage of the same PCF for the AMF and the SMF. The SMF may include that information in the request in discovery and selection parameters to the SCP. The SCP may decide based on operator policy either to use the indicated PCF instance or select another PCF instance.

- In the roaming case, the AMF performs discovery and selection of the H-PCF from NRF as described in this clause. The AMF may indicate the maximum number of H-PCF instances to be returned from NRF, i.e. H-PCF selection at NRF. The AMF uses the received V-PCF ID and available binding information received during the AM policy association procedure to send the UE policy association establishment request, which also includes the H-PCF ID, to the SCP. The SCP discovers and selects the V-PCF. The V-PCF sends an UE policy association establishment request towards the HPLMN, which includes the H-PCF ID as a discovery and selection parameter to SCP.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* End of Changes \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*