**3GPP TSG-SA2 Meeting #137-E *S2-2002064***

**Online, 24th Feb 2020 - 27th Feb 2020 revision from S2-2001285**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
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|  | **23.503** | **CR** | **0385** | **rev** | **2** | **Current version:** | **16.3.0** |  |
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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:***  | Correction of PCF discovery via BSF to consider eSBA binding principles – AF/NEF/SCP re-selection functionality (23.503) |
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| ***Source to WG:*** | Oracle Corporation |
| ***Source to TSG:*** | SA2 |
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| ***Work item code:*** | 5G\_eSBA |  | ***Date:*** | 2020-02-18 |
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| ***Category:*** | **F** |  | ***Release:*** | Rel-16 |
|  | *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-12 (Release 12)**Rel-13 (Release 13)Rel-14 (Release 14)Rel-15 (Release 15)Rel-16 (Release 16)* |
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| ***Reason for change:*** | This CR addresses the discovery and selection functionality for consumers of the BSF so that they can have the same ability to perform PCF selection using binding information retrieved from the BSF as a consumer using the N7 interface to perform PCF selection. This is an alignment CR to S2-2002291 (23.502). In addition this CR adds the SCP as a possible entity, which may need to perform the above retrieval on behalf of the AF or NEF (delegated discovery described in 23.501 Annex E model D). |
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| ***Summary of change:*** | The PCF registers the information required to perform discovery and selection, as described in TS 23.501 [2] clause 6.3.1.0, for the selected PCF with the BSF. The BSF then provides this information as part of the discovery procedure to AF or NEF or SCP on their behalf. The AF or NEF or SCP on their behalf shall use the information retrieved from the BSF to apply the NF consumer or SCP selection and reselection behaviour as described in TS 23.501 [2] clause 6.3.1.0. This change updates various aspects of the procedure to bring PCF selection using BSF binding information into alignment with other NF discovery and selection procedures. This allows the AF, NEF, and other consumers of the BSF service to select a PCF to serve an existing PDU session consistent with the SMF selection of a PCF to serve an existing PDU session. |
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| ***Consequences if not approved:*** | Consumers of the BSF service will not be able to support discovery and selection of the PCF in the same manner as the SMF. If an AF or NEF uses the BSF after the PCF instance within a set has changed, it will obtain an outdated PCF instance that may no longer be available. A binding indication provides more information for selection and re-selection than PCF Set ID alone. In addition not using the binding indication stored at the BSF would introduce inconsistent behaviour with the N7 interface. |
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| ***Clauses affected:*** | 6.1.1.2.1, 6.1.1.2.2 |
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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 ...  |
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| ***Other comments:*** |  |
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| ***This CR's revision history:*** | Revision 1:* Described PCF ID and PCF Set ID are stored in BSF for usage as NF Instance or NF Set level binding.
* Described that PCF manages the stored information in the BSF to indirectly manage the binding indication.
* In Note 1, changed PCF redirection behavior to provide available information about the existing PCF instead of just the PCF ID.
* In Note 2, described that BSF consumer NF uses the Nbsf\_management\_service\_discovery result to determine the level of binding indication to apply for direct and indirect communication.

Revision 2:* Editorial cleanup (eg remove changes on changes, adjusting NOTE numbers due to addition of a new NOTE 1).
* Languistic improvements.
* In section 6.1.1.2.1 the following sentence “…The functionality determines the PCF address and if available the associated PCF instance ID and PCF set ID,” was adjusted to “…The functionality determines the PCF address and if available the associated PCF instance ID and PCF set ID, which may be used as Binding indication (see clause 6.3.1.0 of TS 23.501 [2])”
* In section 6.1.1.2.2 - as per Nokia’s request, a new ‘NOTE 1’ is added to say that only NF instance or NF set level of binding are supported at the BSF.
* In section 6.1.1.2.2 - in the bullet, which starts with the words “For an ongoing NF service session” as per Nokia’s request, keep the words “…This binding indication shall then be used instead of any PCF set ID and/or a PCF instance ID received from the BSF”
 |

1st change

#### 6.1.1.2 Binding an AF request targeting an UE address to the relevant PCF

##### 6.1.1.2.1 General

When multiple and separately addressable PCFs have been deployed, a network functionality is required in order to ensure that an AF needing to send policies about UE traffic identified by an UE address can reach over N5 the PCF holding the corresponding PDU Session information. This network functionality has the following characteristics:

- It has information about the user identity, the DNN, the UE (IP or Ethernet) address(es), the DN information (e.g. S-NSSAI) and the selected PCF address for a certain PDU Session.

- For IP PDU Session type, it shall receive information when an IP address is allocated or released for a PDU Session.

- For Ethernet PDU Sessions supporting binding of AF request based on MAC address, it shall receive information when a MAC address is detected as being used by the UE over the PDU Session; this detection takes place at the UPF under control of SMF; This is defined in TS 23.501 [2] clause 5.8.2.

- The functionality determines the PCF address and if available the associated PCF instance ID and PCF set ID , which may be used as Binding indication (see clause 6.3.1.0 of TS 23.501 [2]) selected by the PCF discovery and selection function described in TS 23.501 [2], according to the information provided by the AF or the NEF.

A private IPv4 address may be allocated to different PDU sessions, e.g.:

- The same UE IPv4 address is allocated to different PDU sessions to the same DNN and different S-NSSAI;

- The same UE IPv4 address is allocated to different PDU sessions to the same S-NSSAI and different DNN.

In the case of private IPv4 address being used for the UE, the AF or the NEF may send DNN and DN information (e.g. S-NSSAI), in addition, in Npcf\_PolicyAuthorization\_Create request and Nbsf\_Management\_Discovery request. The DNN and DN information can be used by the PCF for session binding, and they can be also used to help selecting the correct PCF.

##### 6.1.1.2.2 The Binding Support Function (BSF)

The BSF has the following characteristics:

- For a certain PDU session, the BSF stores internally information about the user identity, the DNN, the UE (IP or Ethernet) address(es), the DN information (e.g. S-NSSAI), the selected PCF address and if available the associated PCF instance ID and PCF set ID, which may be used as Binding indication (see clause 6.3.1.0 of TS 23.501 [2]).

NOTE 1: Only NF instance or NF set Level of Binding indication are supported at the BSF.

- The PCF registers, updates and removes the stored information in the BSF using the Nbsf management service operations defined in TS 23.502 [3].

- The PCF ensures that it is updated each time an IP address is allocated or de-allocated to the PDU Session or, for Ethernet PDU Sessions supporting binding of AF request based on MAC address, each time it has been detected that a MAC address is used or no more used by the UE in the PDU Session.

- Based on operator's policies and configuration, the PCF determines whether the same PCF shall be selected for the SM Policy associations to the same UE ID, S-NSSAI and DNN combination in the non-roaming or home-routed scenario.

NOTE 2: This applies to usage monitoring.

- The selected PCF (if needed) downloads the user profile from the UDR as described in TS 23.502 [3] 4.16.4 step 2. If usage monitoring is enabled for the user, and based on operator's policies, the PCF checks if the BSF has already existing PCF serving the combination of SUPI, S-NSSAI, DNN.

- If no such PCF is found the PCF shall register itself to the BSF as described above in this clause.

- Else if an existing PCF is found for the above combination, the PCF shall return to the SMF the available information about the existing PCF and a redirection indication.

NOTE 3: The assumption is that for DNN, S-NSSAI combinations where usage monitoring be applied, the same BSF instance or the same BSF SET is selected for all UE PDU sessions to the same DNN, S-NNSAI.

- For retrieval binding information, any NF, such as NEF or AF, that needs to discover the selected PCF address(es), and if available, the associated PCF instance ID and PCF set ID (see subclause 6.3.1.0 of TS 23.501 [2])for the tuple (UE address, DNN, S-NSSAI, SUPI, GPSI) (or for a subset of this Tuple) uses the Nbsf management service discovery service operation defined in TS 23.502 [3].

- The NF may discover the BSF via NRF or based on local configuration. In case of via NRF the BSF registers the NF profile in NRF. The Range(s) of UE IPv4 addresses, Range(s) of UE IPv6 prefixes supported by the BSF may be provided to NRF.

- If the NF received a PCF set ID or a PCF instance ID as result of the Nbsf manageent service discovery service operation, it should use that information as NF set level or NF instance level Binding Indication to route requests to the PCF as defined in subclause 6.3.1.0 of TS 23.501 [2] and according to the following provisions:

 If the NF received a PCF set ID but no PCF instance ID, the PCF instance within the PCF set may change. If an NF is not able to reach the received PCF address(es) and applies direct discovery, it should query the NRF for PCF instances within the PCF set and select another instance.

 If the NF received a PCF set ID and a PCF instance ID, the PCF service instance within the PCF may change. If an NF is not able to reach the received PCF address(es) and applies direct discovery, it should query the NRF for PCF service instances within the PCF and select another instance.

- The NF should provide a Routing Binding Indication based on the received PCF set ID and possible PCF instance ID in requests it sends to the PCF.

- For an ongoing NF service session, the PCF may provide Binding indication to the NF (see clause 6.3.1.0 of TS 23.501 [2]). This binding indication shall then be used instead of any PCF information received from the BSF.

- If a new PCF instance is selected, the new PCF should invoke Nbsf\_Management\_Update service operation to update the binding information in BSF.

The BSF may be deployed standalone or may be collocated with other network functions, such as PCF, UDR, NRF, SMF.

NOTE 3: Collocation allows combined implementation.

End of changes