**3GPP TSG-WG SA2 Meeting #143E e-meeting *S2-210xxxx***

**Elbonia, February 24 – March 09, 2021 (revision of S2-210xxxx)**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **23.503** | **CR** |  | **rev** | **-** | **Current version:** | **16.7.0** |  |
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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:*** | BSF enhancement on PCF Discovery for dynamic AM policy | | | | | | | | | |
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| ***Source to WG:*** |  | | | | | | | | | |
| ***Source to TSG:*** | SA2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | DCAMP | | | | |  | ***Date:*** | | | 2021-01-02 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***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 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-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Currently, the BSF only supports PCF discovery for a PDU Session, but DCAMP requires PCF discovery for a UE. In addition, DCAMP requires discovery of PCF for PDU Session by PCF for UE. | | | | | | | | |
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| ***Summary of change:*** | | Update the BSF description to support PCF discovery for a UE as well as support of discovery of PCF for PDU Session by PCF for UE. | | | | | | | | |
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| ***Consequences if not approved:*** | | PCF Discovery for dynamic AM policy is not supported. | | | | | | | | |
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| ***Clauses affected:*** | | 6.1.1 | | | | | | | | |
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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 \* \* \* \*

### 6.1.1 General

#### 6.1.1.1 PCF Discovery and Selection

The procedures for PCF Discovery and Selection by the AMF and by the SMF are described in TS 23.501 [2].

The procedure to ensure that an AF or PCF for a UE reaches the PCF selected for a PDU Session is described in clause 6.1.1.2.

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

##### 6.1.1.2.1 General

The procedure to ensure that an AF reaches the PCF for a UE is described in clause 6.1.1.2.1.x.

NOTE 1: The above is required for dynamic control of access and mobility related policy control functionality.

When multiple and separately addressable PCFs have been deployed, a network functionality is required in order to ensure that a consumer (e.g. 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 MAC) address(es), the 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 and is defined in TS 23.501 [2] clause 5.8.2). In addition, it receives the DS-TT port MAC address in case of IEEE TSN integration (as described in clause 5.28.2 of TS 23.501 [2]).

- The functionality determines the PCF address and if available the associated PCF instance ID and PCF set ID, 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 S-NSSAI, in addition, in Npcf\_PolicyAuthorization\_Create request and Nbsf\_Management\_Discovery request. The DNN and S-NSSAI can be used by the PCF for session binding, and they can be also used to help selecting the correct PCF.

###### 6.1.1.2.1.1 Binding an AF request to the relevant PCF for a UE

When multiple and separately addressable PCFs have been deployed, a network functionality is required in order to ensure that a consumer (e.g. AF) needing to influence AM policies for a UE identified by an user identity can reach the PCF serving the UE. This network functionality has the following characteristics:

- It has information about the user identity, and the selected PCF address for a certain UE.

- The functionality determines the PCF address and if available the associated PCF instance ID and PCF set ID, 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.

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

The BSF has the following characteristics:

- The BSF stores internally information about the corresponding selected PCF address.

- For a certain PDU Session, the BSF stores internally information about the user identity, the DNN, the UE (IP or MAC) address(es), the S-NSSAI, the selected PCF address and if available the associated PCF instance ID, PCF set ID and the level of binding (see clause 6.3.1.0 of TS 23.501 [2]).

- For a certain UE, the BSF stores internally information about the user identity, the selected PCF address and if available the associated PCF instance ID, PCF set ID and the level of binding (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].

- For a PDU Session, 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.

- For a UE, the PCF ensures that it is updated each time the AMF selects a new PCF during UE mobility.

- 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] clause 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.

- The BSF needs to verify whether to provide the address of a PCF for a PDU Session or a PCF for a UE according to the information provided by the AF or the NEF. If the request from AF or NEF contains user identity and does not contain UE address, the BSF shall provide the address of the PCF for a UE. If the request from AF or NEF contains UE address, the BSF shall provide the address of the PCF for a PDU Session.

- The BSF needs to provide the address of a PCF for a PDU Session according to the information provided by the PCF for a UE. The information provided by the PCF for a UE may include SUPI or/and GPSI and/or DNN and/or S-NSSAI.

NOTE 4: It is up to stage3 to ensure an unambiguous error proof way for the BSF to differentiate between PCF for a PDU Session and PCF for a UE. This might or might not require providing the BSF additional parameter(s) when a PCF registers itself with the BSF and/or when a consumer attempts to discover a PCF via discovery or subscription.

- 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, PCF set ID and level of binding (see clause 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 the 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 with an indication of level of binding as result of the Nbsf management 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 clause 6.3.1.0 of TS 23.501 [2] and according to the following provisions:

- For the NF set level of binding, the NF will receive a PCF set ID but no PCF instance ID. 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.

- For the NF instance level of binding, the NF will receive a PCF set ID and a PCF instance ID. 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, level of binding 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 5: Collocation allows combined implementation.

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