**3GPP TSG-CT3 Meeting #112e C3-205054\_r1**

**E-Meeting, 04th – 13th November 2020**

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
|  |
|  | **29.521** | **CR** | **0093** | **rev** | **1** | **Current version:** | **16.5.0** |  |
|  |
| *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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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network | **X** |

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|  |
| ***Title:***  | Essential corrections and alignments |
|  |  |
| ***Source to WG:*** | Huawei |
| ***Source to TSG:*** | CT3 |
|  |  |
| ***Work item code:*** | SBIProtoc16 |  | ***Date:*** | 2020-10-?? |
|  |  |  |  |  |
| ***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-15 (Release 15)Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)* |
|  |  |
| ***Reason for change:*** | The following corrections and alignments are necessary:* The "Resource URI" column of Table 5.3.1-1 should contain a "<relative URI below root>" instead of a full resource URI, as per the API TS skeleton provided in TS 29.501.
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|  |  |
| ***Summary of change:*** | * Update the "Resource URI" column of Table 5.3.1-1 by replacing the full resource URI with the associated "<relative URI below root>", i.e. by removing the part "{apiRoot}/<apiName>/<apiVersion>".
* Some additional editorial corrections to improve the text.
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| ***Consequences if not approved:*** | Necessary corrections are not applied. |
|  |  |
| ***Clauses affected:*** | 4.1.1, 4.1.2, 4.1.3.1, 4.1.3.2, 4.2.2.1, 4.2.2.2, 4.2.4.2, 5.3.1 |
|  |  |
|  | **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 does not impact OpenAPI specification files. |
|  |  |
| ***This CR's revision history:*** | Rev 1: Revert some unecessary changes in clause 4.2.2.1 and correct the last "400 Bad Request" in a similar way to the ones preceding it in clause 4.2.4.2. |

\* \* \* Start of changes \* \* \* \*

### 4.1.1 Overview

The Binding Support Management Service, as defined in 3GPP TS 23.502 [3] and 3GPP TS 23.503 [4], is provided by the Binding Support Function (BSF).

The Nbsf\_Management service is used to provide a PDU session binding functionality, which ensures that an AF request for a certain PDU Session reaches the relevant PCF holding that PDU Session information.

This service:

- allows NF service consumers to register, update and remove binding information; and

- allows NF service consumers to retrieve binding information.

\* \* \* Next changes \* \* \* \*

4.1.2 Service Architecture

The 5G System Architecture is defined in 3GPP TS 23.501 [2]. The Policy and Charging related 5G architecture is also described in 3GPP TS 23.503 [4] and 3GPP TS 29.513 [5].

The Binding Support Management Service (Nbsf\_Management) is exhibited by the Binding Support Function (BSF).

The known consumers of the Nbsf\_Management service are:

- Policy Control Function (PCF)

- Network Exposure Function (NEF)

- Application Function (AF); and

- Network Data Analytics Function (NWDAF)

As described in 3GPP TS 23.503 [4], the BSF is a function that can be deployed standalone or as a functionality provided by other network functions, such as PCF, UDR, NRF, SMF.

NOTE 1: The PCF accesses the Nbsf\_Management service at the BSF via an internal interface when it is collocated with BSF.

NOTE 2: The DRA decides to select a BSF based on user IP address range when the DRA has no binding information for the subscriber to get the relevant PCF address. DRA and BSF coexistence is described in 3GPP TS 29.513 [5], Annex A.

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**Figure 4.1.2-1: Reference Architecture for the Nbsf\_Management service; SBI representation**

\* \* \* Next changes \* \* \* \*

4.1.3.1 Binding Support Function (BSF)

The BSF:

- stores the binding information for a certain PDU Session; and

- enables the discovery of binding information (e.g. the address information of the selected PCF).

The BSF allows NF service consumers (e.g. PCF) to register, update and remove a binding information, and allows NF service consumers (e.g. AF, NEF, NWDAF) to discover a binding information (e.g. the address information of the selected PCF).

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

\* \* \* Next changes \* \* \* \*

4.1.3.2 NF Service Consumers

The Policy Control Function (PCF):

- registers binding information in the BSF for a UE when an IPv4 address and/or IPv6 prefix is allocated, or a MAC address is used for the PDU session;

- updates binding information in the BSF when a UE address information is changed for the PDU Session; and

- removes binding information in the BSF when an IPv4 address and/or IPv6 prefix is released, or a MAC address is not used for the PDU Session.

The Network Exposure Function (NEF):

- provides means for the Application Functions to securely interact with the Policy framework for policy control to 3GPP network. During the procedure, it needs to discover the selected PCF by using the Nbsf\_Management\_Discovery service operation.

The Application Function (AF):

- discovers the selected PCF by using the Nbsf\_Management\_Discovery service operation when it is allowed to interact directly with the policy framework for policy control.

The Network Data Analytics Function (NWDAF):

- discovers the selected PCF by using the Nbsf\_Management\_Discovery service operation.

\* \* \* Next changes \* \* \* \*

#### 4.2.2.1 General

This service operation allows a NF service consumer (e.g. PCF) to register the session binding information for a UE in the BSF by providing the user identity, the DNN, the UE address(es) and the selected PCF address for a certain PDU Session to the BSF, and BSF stores the information.

If the BindingUpdate feature is not supported and the NF service consumer (e.g. PCF) receives a new UE address (e.g. IPv6 prefix) and has already registered session binding information for this PDU session, the NF service consumer (e.g. PCF) shall register a new session binding information in the BSF.

\* \* \* Next changes \* \* \* \*

4.2.2.2 Register a new PCF Session binding information

**Figure 4.2.2.2-1: NF service consumer register a new PCF Session binding information**

The NF service consumer shall invoke the Nbsf\_Management\_Register service operation to register the session binding information for a UE in the BSF. The NF service consumer shall send for this an HTTP POST request with "{apiRoot}/nbsf-management/v1/pcfBindings" as Resource URI representing the "PCF Session Bindings", as shown in figure 4.2.2.2-1, step 1, to create a binding information for an "Individual PCF Session Binding" according to the information (e.g. UE address(es), SUPI, GPSI, DNN, S-NSSAI) in the message body. The "PcfBinding" data structure provided in the request body shall include:

- if the "MultiUeAddr" feature is not supported or not yet known, address information of the served UE consisting of:

(i) either IP address information consisting of:

+ the IPv4 address encoded as "ipv4Addr" attribute; and/or

+ the /128 IPv6 address, the IPv6 address prefix or an IPv6 prefix shorter than /64 encoded as "ipv6Prefix" attribute; or

(ii) the MAC address encoded as "macAddr48" attribute;

Otherwise, address information of the served UE consisting of:

(i) any IP address information consisting of:

+ the IPv4 address encoded as "ipv4Addr" attribute;

+ the /128 IPv6 address, the IPv6 address prefix or an IPv6 prefix shorter than /64 encoded as "ipv6Prefix" attribute; and/or

+ the additional /128 IPv6 addresses, the IPv6 address prefixes or IPv6 prefixes shorter than /64 encoded as "addIpv6Prefixes" attribute; or

(ii) the MAC address encoded as "macAddr48" attribute and/or the additional MAC addresses encoded as "addMacAddrs" attribute;

When the "TimeSensitiveNetworking" feature is supported by the PCF as defined in subclause 5.8 of 3GPP TS 29.512 [21], the address information of the served UE contains the MAC address of the DS-TT encoded in the "macAddr48" attribute as received by the PCF when reporting the bridge information attribute.

- PCF address information consisting of:

(i) if the PCF supports the Npcf\_PolicyAuthorization service:

+ the FQDN of the PCF encoded as "pcfFqdn" attribute; and/or

+ a description of IP endpoints at the PCF hosting the Npcf\_PolicyAuthorization service encoded as "pcfIpEndPoints" attribute; and

(ii) if the PCF supports the Rx interface:

+ the Diameter host id of the PCF encoded as "pcfDiamHost"; and

+ the Diameter realm of the PCF encoded as"pcfDiamRealm" attributes;

- DNN encoded as "dnn" attribute; and

- S-NSSAI encoded as "snssai" attribute;

- If the "SamePcf" feature defined in subclause 5.8 is supported and the PCF determines based on operator policies that the same PCF shall be selected for the SM Policy associations:

(i) PCF address information for Npcf\_SMPolicyControl service consisting of:

+ the FQDN of the PCF encoded as "pcfSmFqdn" attribute; or

+ a description of IP endpoints at the PCF hosting the Npcf\_SMPolicyControl service encoded as "pcfSmIpEndPoints" attribute; and

(ii) the parameters combination for selecting the same PCF encoded within the "paraCom" attribute;

- Framed routes consisting of:

(i) one or more framed routes within the "ipv4FrameRouteList" attribute for IPv4; and/or

(ii) one or more framed routes within the "ipv6FrameRouteList" attribute for IPv6;

and may include:

- SUPI encoded as "supi" attribute;

- GPSI encoded as "gpsi" attribute; and

- IPv4 address domain encoded as "ipDomain" attribute.

Upon the reception of an HTTP POST request with: "{apiRoot}/nbsf-management/v1/pcfBindings" as Resource URI and "PcfBinding" data structure as request body, the BSF shall:

- create new binding information;

- assign a bindingId; and

- store the binding information.

The PCF as NF service consumer may provide PCF Id in "pcfId" attribute and recovery timestamp in "recoveryTime" attribute. The BSF may use the "pcfId" attribute to supervise the status of the PCF as described in subclause 5.2 of 3GPP TS 29.510 [12] and perform necessary clean up upon status change of the PCF later, and/or both the "pcfId" attribute and the "recoveryTime" attribute in clean up procedure as described in subclause 6.4 of 3GPP TS 23.527 [17].

The PCF as a NF service consumer may provide PCF Set Id within the "pcfSetId" attribute and "bindLevel" attribute set to NF\_SET or provide PCF Set Id within the "pcfSetId" attribute, PCF instance Id within the "pcfId" attribute and "bindLevel" attribute set to NF\_INSTANCE.

If the BSF created an "Individual PCF Session Binding" resource, the BSF shall respond with "201 Created" status code with the message body containing a representation of the created binding information, as shown in figure 4.2.2.2-1, step 2. The BSF shall include a Location HTTP header field containing the URI of the created binding information, i.e. "{apiRoot}/nbsf-management/v1/pcfBindings/{bindingId}".

If errors occur when processing the HTTP POST request, the PCF shall apply error handling procedures as specified in subclause 5.7.

If the "SamePcf" feature defined in subclause 5.8 is supported and the "paraCom" attribute is included in the HTTP POST message and the BSF detects that there is an existing PCF binding information for the indicated combination within the "paraCom" attribute, the BSF shall reject the request with an HTTP "403 Forbidden" status code and shall include in the response the "ExtProblemDetails" data structure including the FQDN of the existing PCF hosting the Npcf\_SMPolicyControl service within the "pcfSmFqdn" attribute or the description of IP endpoints at the existing PCF hosting the Npcf\_SMPolicyControl service within the "pcfSmIpEndPoints" attribute of "BindingResp" data structure, and the "cause" attribute of the "ProblemDetails" data structure set to "EXISTING\_BINDING\_INFO\_FOUND".

\* \* \* Next changes \* \* \* \*

4.2.4.2 Retrieve the PCF Session binding information for a given tuple

**Figure 4.2.4.2-1: NF service consumer retrieve the PCF Session binding information for a given tuple**

The NF service consumer shall invoke the Nbsf\_Management\_Discovery service operation to obtain address information of the selected PCF for a PDU session in the BSF. The NF service consumer shall send an HTTP GET request with "{apiRoot}/nbsf-management/v1/pcfBindings" as Resource URI, and "query parameters" that shall include:

- UE address;

and may include:

- SUPI or GPSI;

- DNN and optionally S-NSSAI; and

- IPv4 address domain.

NOTE: The query parameters S-NSSAI and/or IPv4 address domain are helpful in the scenario of IPv4 address overlapping where the same IPv4 address may be allocated to UE PDU sessions.

Upon the reception of an HTTP GET request with: "{apiRoot}/nbsf-management/v1/pcfBindings" as Resource URI, the BSF shall search the corresponding binding information. If "ipv6Prefix" is used as an UE IPv6 address in the query parameters, the BSF shall use the longest prefix match to find a matching IPv6 prefix so that the IPv6 address in the query parameters is within the address range covered by that matching IPv6 prefix. The IPv6 address in the query parameters shall be formatted as an IPv6 prefix value including the trailing prefix length "/128". If the framed routes exist in the binding information, the BSF shall use framed routes to match the UE address in the query parameters.

If the HTTP request message from the NF service consumer is accepted and a session binding resource matching the query parameters exists, the BSF shall reply with an HTTP "200 OK" response, as shown in figure 4.2.4.2-1, step 2, containing the corresponding "PcfBinding" data structure, as provided by the PCF during the Nbsf\_Management\_Register Service Operation, in the response body containing PCF addressing information, and if available, the related PCF Set Id and PCF instance Id. If there is no PCF session binding information matching the query parameters, the BSF shall respond with an HTTP "204 No Content".

NOTE 2: If the NF service consumer (such as the AF or NEF) is not able to reach the received PCF address(es), the NF service consumer can use the PCF Set Id and the PCF instance Id as specified in 3GPP TS 29.513 [5] subclause 6.2.

If the "PCF Session Bindings" resource does not exist, the BSF shall respond with "404 Not Found" HTTP error code. If an invalid combination of query parameters (i.e. a combination without UE address) is contained in the request URI, the BSF shall respond with an HTTP "400 Bad Request" error code containing "MANDATORY\_QUERY\_PARAM\_MISSING" as application error within the ProblemDetails IE. If more than one PCF Session Binding resources are found, the BSF shall respond with an HTTP "400 Bad Request" error code containing "MULTIPLE\_BINDING\_INFO\_FOUND" as application error within the ProblemDetails IE.

\* \* \* Next changes \* \* \* \*

5.3.1 Resource Structure

The structure of the Resource URI of the Nbsf\_Management service is shown in figure 5.3.1-1.

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**Figure 5.3.1-1: Resource URI structure of the Nbsf\_Management API**

Table 5.3.1-1 provides an overview of the resources and applicable HTTP methods.

**Table 5.3.1-1: Resources and methods overview**

|  |  |  |  |
| --- | --- | --- | --- |
| **Resource name** | **Resource URI** | **HTTP method or custom operation** | **Description** |
| PCF Session Bindings | /pcfBindings | POST | Register a new PCF Session binding information of a given UE address in the BSF. |
| GET | Retrieve the Session binding information i.e. PCF address information of a given tuple (UE address, SUPI; GPSI, DNN, S-NSSAI). |
| Individual PCF Session Binding  | /pcfBindings/{bindingId} | DELETE | Deregister an existing PCF Session binding information from the BSF.  |
| PATCH | Update an existing PCF Session binding information in the BSF. |

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