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1 Scope

The present specification provides the stage 3 definition of the Binding Support Management Service of the 5G System.

The 5G System Architecture is defined in 3GPP TS 23.501 [2]. The stage 2 definition and related procedures for Binding Support Management Service is specified in 3GPP TS 23.502 [3] and 3GPP TS 23.503 [4].

The 5G System stage 3 call flows are provided in 3GPP TS 29.513 [5].

The Technical Realization of the Service Based Architecture and the Principles and Guidelines for Services Definition are specified in 3GPP TS 29.500 [6] and 3GPP TS 29.501 [7].

The Binding Support Management Service is provided by the Binding Support Function (BSF).

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
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- [1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
- [2] 3GPP TS 23.501: "System Architecture for the 5G System; Stage 2".
- [3] 3GPP TS 23.502: "Procedures for the 5G System; Stage 2".
- [4] 3GPP TS 23.503: "Policy and Charging Control Framework for the 5G System; Stage 2".
- [5] 3GPP TS 29.513: "5G System; Policy and Charging Control signalling flows and QoS parameter mapping; Stage 3".
- [6] 3GPP TS 29.500: "5G System; Technical Realization of Service Based Architecture; Stage 3".
- [7] 3GPP TS 29.501: "5G System; Principles and Guidelines for Services Definition; Stage 3".
- [8] IETF RFC 7540: "Hypertext Transfer Protocol Version 2 (HTTP/2)".
- [9] IETF RFC 8259: "The JavaScript Object Notation (JSON) Data Interchange Format".
- [10] 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces Stage 3".
- [11] OpenAPI: "OpenAPI Specification Version 3.0.0", <https://spec.openapis.org/oas/v3.0.0>.
- [12] 3GPP TS 29.510: "5G System; Network Function Repository Services; Stage 3".
- [13] IETF RFC 7807: "Problem Details for HTTP APIs".
- [14] 3GPP TS 29.213: "Policy and Charging Control signalling flows and Quality of Service (QoS) parameter mapping".
- [15] 3GPP TS 33.501: "Security architecture and procedures for 5G system".
- [16] IETF RFC 6749: "The OAuth 2.0 Authorization Framework".
- [17] 3GPP TS 23.527: "5G System; Restoration Procedures".

- [18] 3GPP TR 21.900: "Technical Specification Group working methods".
- [19] 3GPP TS 23.316: "Wireless and wireline convergence access support for the 5G System (5GS)".
- [20] IETF RFC 7396: "JSON Merge Patch".
- [21] 3GPP TS 29.512: "5G System; Session Management Policy Control Service; Stage 3".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1].

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [1].

5G-RG	5G Residential Gateway
AF	Application Function
AM	Access and Mobility Management
BSF	Binding Support Function
DNN	Data Network Name
DRA	Diameter Routing Agent
HTTP	Hypertext Transfer Protocol
FN-RG	Fixed Network Residential Gateway
FQDN	Fully Qualified Domain Name
GPSI	Generic Public Subscription Identifier
JSON	JavaScript Object Notation HTTP Hypertext Transfer Protocol
MAC	Media Access Control
MBSF	Multicast/Broadcast Service Function
NEF	Network Exposure Function
NRF	Network Repository Function
NWDAF	Network Data Analytics Function
PCF	Policy Control Function
SMF	Session Management Function
S-NSSAI	Single Network Slice Selection Assistance Information
SUPI	Subscription Permanent Identifier
TSCTSF	Time Sensitive Communication and Time Synchronization Function
UDR	Unified Data Repository

4 Binding Support Management Service

4.1 Service Description

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 PCF for 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, or ensures that the same PCF is selected for multiple PDU sessions.
- a PCF for an MBS session binding functionality, which ensures that for location dependent MBS services, an AF request for a certain MBS Session reaches the relevant PCF holding that MBS Session information.
- a PCF for a UE binding functionality, which ensures that an AF request for Access and Mobility related Policy Authorization for a UE reaches the relevant PCF for a UE holding the AM Policy Association.
- Subscription to notification events about a newly registered or deregistered PCF for a UE or PCF for a PDU session.

This service:

- allows NF service consumers to register, update and remove binding information;
- allows NF service consumers to retrieve binding information;
- allows NF service consumers to subscribe to notifications of registration/deregistration events of newly registered or deregistered PCF for a UE or PCF for a PDU session.

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);
- Multicast/Broadcast Service Function (MBSF);
- Network Data Analytics Function (NWDAF); and
- Time Sensitivity Communication and Time Synchronization Function (TSCTSf).

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 for a PDU session address. DRA and BSF coexistence is described in 3GPP TS 29.513 [5], Annex A.

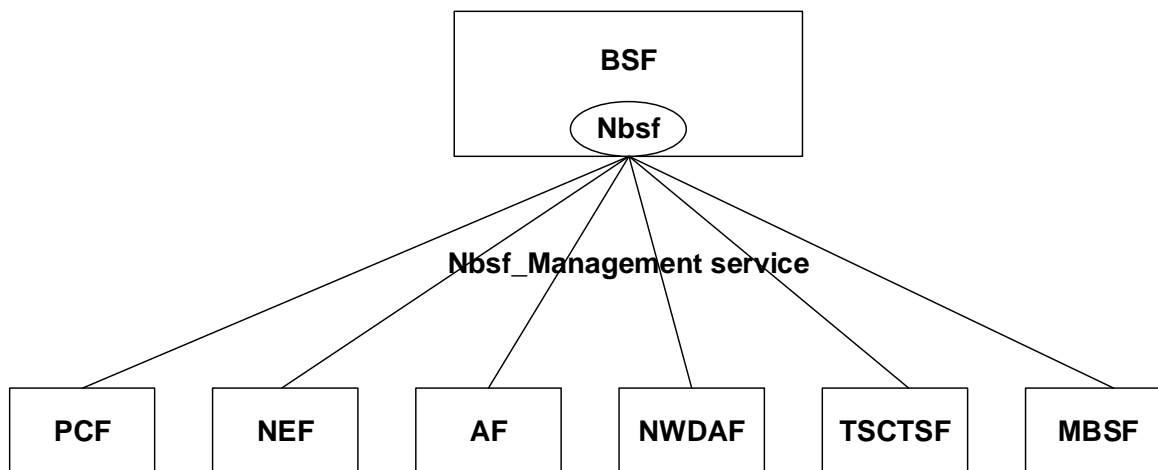


Figure 4.1.2-1: Reference Architecture for the Nbsf_Management service; SBI representation

NOTE 3: The PCF in the figure represents both, the PCF for a UE and the PCF for a PDU session. The PCF for a UE and the PCF for a PDU session separately and independently register themselves at the BSF, regardless they are deployed in the same NF instance or separately in different NF instances.

4.1.3 Network Functions

4.1.3.1 Binding Support Function (BSF)

The BSF:

- stores the binding information for a certain PDU Session;
- stores the binding information for a certain MBS Session;
- stores the binding information for a certain UE;
- enables the subscription to notifications of PCF for a PDU session registration/deregistration events;
- enables the subscription to notifications of PCF for a UE registration/deregistration events;and
- enables the discovery of binding information (e.g. the address information of the selected PCF for a PDU session).

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 also allows NF service consumers (e.g. PCF for a UE, AF, NEF) to subscribe to notifications of PCF registration/deregistration events.

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

4.1.3.2 NF Service Consumers

The Policy Control Function (PCF):

- The PCF for a PDU session:
 - a. 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;
 - b. updates binding information in the BSF when a UE address information is changed for the PDU Session; and

- c. 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 PCF for an MBS session:
 - a. registers binding information in the BSF for an MBS session;
 - b. updates binding information in the BSF for the MBS session;
 - c. removes binding information in the BSF for the MBS session.
- The PCF for a UE:
 - a. registers binding information in the BSF for a UE when an AM Policy Association is established;
 - b. removes binding information in the BSF when the AM Policy Association is terminated; and
 - c. subscribes with the BSF to notification of registration/deregistration events of the PCF for a 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 for a PDU session, the selected PCF for an MBS Session (if applicable) or the selected PCF for a UE by using the Nbsf_Management_Discovery service operation and the selected PCF for a UE by using the Nbsf_Management_Subscribe/Notify service operations.

The Application Function (AF):

- discovers the selected PCF for a PDU session, the selected PCF for an MBS Session (if applicable) or the selected PCF for a UE by using the Nbsf_Management_Discovery service operation and the selected PCF for a UE by using the Nbsf_Management_Subscribe/Notify service operations when it is allowed to interact directly with the policy framework for policy control.

The Network Data Analytics Function (NWDAF):

- discovers the selected PCF for a PDU session by using the Nbsf_Management_Discovery service operation.

The Time Sensitive Communication and Time Synchronization Function (TSCTSF)

- discovers the selected PCF for a PDU session by using the Nbsf_Management_Discovery service operation and the selected PCF for a UE by using Nbsf_Management_Subscribe/Notify service operations when it is allowed to interact with the policy framework for time sensitive communication and time synchronization control.

The Multicast/Broadcast Service Function (MBSF):

- discovers the selected PCF for an MBS session by using the Nbsf_Management_Discovery service operation.

4.2 Service Operations

4.2.1 Introduction

Table 4.2.1-1: Operations of the Nbsf_Management Service

Service operation name	Description	Initiated by
Nbsf_Management_Register	This service operation is used to register the binding information for a PDU session or an MBS session or a UE.	NF service consumer (e.g., PCF)
Nbsf_Management_Deregister	This service operation is used to deregister the binding information for a PDU session or an MBS session or a UE.	NF service consumer (PCF)
Nbsf_Management_Discovery	This service operation is used by an NF service consumer to discover a selected PCF for a PDU session or a selected PCF for an MBS session or a selected PCF for a UE.	NF service consumer (e.g., NEF, AF, NWDAF, MBSF)
Nbsf_Management_Update	This service operation is used to update an existing binding information for a PDU session or an MBS session or a UE.	NF service consumer (e.g., PCF)
Nbsf_Management_Subscribe	This service operation is used by an NF service consumer to subscribe or to modify a subscription for event notifications of PCF for the UE or PCF for the PDU session binding related events.	NF service consumer (e.g., NEF, AF, PCF)
Nbsf_Management_Unsubscribe	This service operation is used by an NF service consumer to terminate a previous subscription.	NF service consumer (e.g., NEF, AF, PCF)
Nbsf_Management_Notify	This service operation is used by the BSF to notify binding related event(s) to the NF service consumer which has subscribed to such event(s).	BSF

4.2.2 Nbsf_Management_Register Service Operation

4.2.2.1 General

This service operation allows a NF service consumer (e.g. PCF for a PDU session) 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 for a PDU session) 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 for a PDU session) shall register a new session binding information in the BSF.

If the SamePcf feature or the ExtendedSamePcf feature is supported, this service operation allows the NF service consumer (e.g. PCF for a PDU session) to check whether PCF addressing information for Npcf_SMPolicyControl service is already registered in the BSF by another PCF for a combination of the UE ID, DNN and S-NSSAI parameters of the PDU session.

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

In addition, this service operation also allows a NF service consumer (e.g. PCF for an MBS session) to register the session binding information for an MBS Session at the BSF, by providing the MBS Session ID, the identifier of the selected PCF for the MBS Session and the related information (e.g. PCF (service) set information), and the BSF stores the information.

The following procedures using the Nbsf_Management_Registration service operation are supported:

- Register a new PCF for a PDU Session binding information.
- Register a new PCF for a UE binding information.

- Register a new PCF for an MBS Session binding information.

4.2.2.2 Register a new PCF for a PDU Session binding information

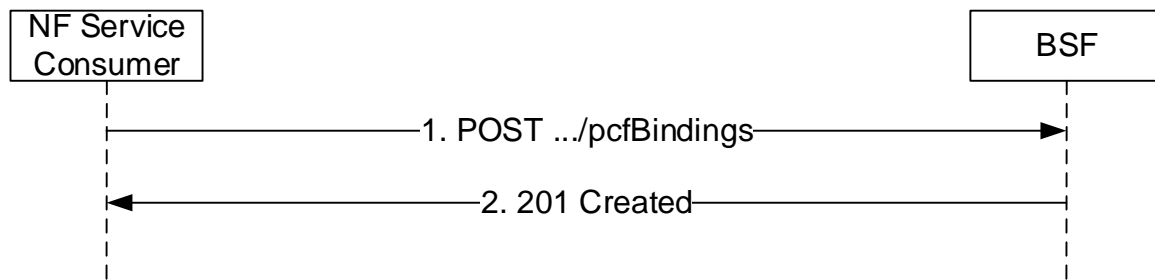


Figure 4.2.2.2-1: NF service consumer register a new PCF for a PDU Session binding information

The NF service consumer shall invoke the `Nbsf_Management_Register` service operation to register the PDU 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/<apiVersion>/pcfBindings` as Resource URI representing the "PCF for a PDU Session Bindings", as shown in figure 4.2.2.2-1, step 1, to create a binding information for an "Individual PCF for a PDU Session Binding" according to the information (e.g. UE address(es), SUPI, GPSI, DNN, S-NSSAI) in the message body. When the "ExtendedSamePcf" feature is not supported, 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:
 - 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
 - the MAC address encoded as "macAddr48" attribute;
 Otherwise, address information of the served UE consisting of:
 - 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
 - the MAC address encoded as "macAddr48" attribute and/or the additional MAC addresses encoded as "addMacAddrs" attribute;
- PCF address information consisting of:
 - 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
 - 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;
- S-NSSAI encoded as "snssai" attribute; and
- If the "SamePcf" feature defined in clause 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 if the PCF registers the binding information for the indicated parameter combination for the first time.

NOTE 1: When the "SamePcf" feature is supported, the PCF omits the "paraCom" attribute when creates the corresponding binding information related to the subsequent PDU sessions for the same parameter combination.

and may include:

- SUPI encoded as "supi" attribute;
- GPSI encoded as "gpsi" attribute;
- IPv4 address domain encoded as "ipDomain" attribute; and
- 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.

When the "TimeSensitiveNetworking" feature or the "TimeSensitiveCommunication" feature is supported by the PCF as defined in clause 5.8 of 3GPP TS 29.512 [21], and for Ethernet type of PDU sessions, the address information of the served UE contains the MAC address of the DS-TT port encoded in the "macAddr48" attribute as received by the PCF when the SMF reports the bridge information of the detected TSC user plane node.

NOTE 2: For the integration with time sensitive communication networks using IP type of applications, the address information of the served UE contains the UE IP address of the corresponding PDU session.

When the "ExtendedSamePcf" feature is supported the address information of the served UE may be provided if available, i.e., the "ipv4Addr", the "ipv6Prefix" and/or "addIpv6Prefixes" attributes or the "macAddr48" and/or "addMacAddrs" attributes may be provided if available.

When the "ExtendedSamePcf" feature is supported the PCF address for the Npcf_PolicyAuthorization and/or Rx interface may be provided if available, i.e., the "pcfFqdn" and/or the "pcfIpEndPoints" attributes, and/or the "pcfDiamHost" and/or the "pcfDiamRealm" attributes may be provided if available.

NOTE 3: Before requesting the BSF to check if there is an existing PCF binding information for the same UE ID, S-NSSAI and DNN combination registered by other PCF(s), the PCF determines whether the BSF supports the "SamePcf" and/or "ExtendedSamePcf" features either via local configuration or by checking the BSF profile retrieved from the NRF as specified in 3GPP TS 29.510 [12].

Upon the reception of an HTTP POST request with: "{apiRoot}/nbsf-management/<apiVersion>/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 clause 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 clause 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 for a PDU 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/<apiVersion>/pcfBindings/{bindingId}".

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

If the "SamePcf" feature defined in clause 5.8 is supported and the "paraCom" attribute is included in the HTTP POST message, the BSF shall check the received "paraCom" attribute. If the BSF detects that there is an existing PCF binding information including the same "dnn", "snssai" and "supi" attribute values as each of the corresponding attribute values 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".

4.2.2.3 Register a new PCF for a UE binding information

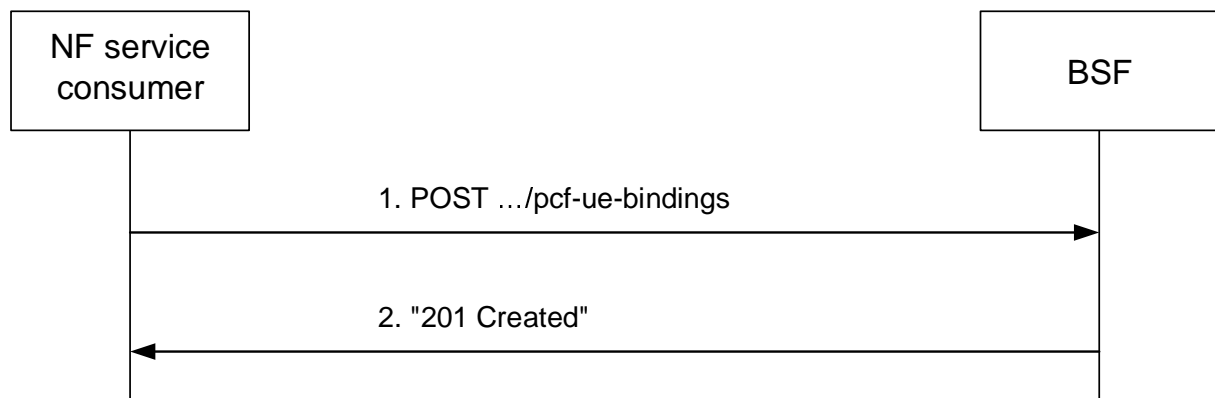


Figure 4.2.2.3-1: NF service consumer registers a new PCF for a UE binding information

The NF service consumer shall invoke the Nbsf_Management_Register service operation to register the PCF for a UE binding information in the BSF. The NF service consumer shall send for this an HTTP POST request with "{apiRoot}/nbsf-management/<apiVersion>/pcf-ue-bindings" as Resource URI representing the "PCF for a UE Bindings", as shown in figure 4.2.2.3-1, step 1, to create a binding information for an "Individual PCF for a UE Binding" according to the information in the message body.

The "PcfForUeBinding" data structure included in the request message body shall include:

- SUPI encoded as "supi" attribute; and
- if the PCF supports the Npcf_AMPolicyAuthorization service, the Npcf_AMPolicyAuthorization service address information consisting of:
 - a. the FQDN of the PCF encoded as "pcfForUeFqdn" attribute; and/or
 - b. a description of IP endpoints at the PCF hosting the Npcf_AMPolicyAuthorization service encoded as "pcfForUeIpEndPoints" attribute;

NOTE: In this release of the specification the PCF for a UE registering the binding information in the BSF supports the Npcf_AMPolicyAuthorization service.

and may include:

- GPSI encoded as "gpsi" attribute;
- PCF instance Id in "pcfId" attribute;
- the PCF Set identifier in the "pcfSetId" attribute; and
- the binding level in the "bindLevel" attribute.

Upon the reception of an HTTP POST request with: "{apiRoot}/nbsf-management/<apiVersion>/pcf-ue-bindings" as Resource URI and "PcfForUeBinding" data structure as request body, the BSF shall:

- create new binding information;
- assign a bindingId; and
- store the binding information.

The PCF as a NF service consumer may provide information about the PCF Set and the binding level of subsequent request to the same or different PCF instances for the Npcf_AMPolicyControl service. The PCF may provide the PCF Set Id within the "pcfSetId" attribute and "bindLevel" attribute set to NF_SET, or may provide the 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 for a UE 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 4.2.2.3-1, step 2. The BSF shall include a Location HTTP header field containing the URI of the created binding information, i.e. "{apiRoot}/nbsf-management/<apiVersion>/pcf-ue-bindings/{bindingId}".

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

4.2.2.4 Register a new PCF for an MBS Session binding information

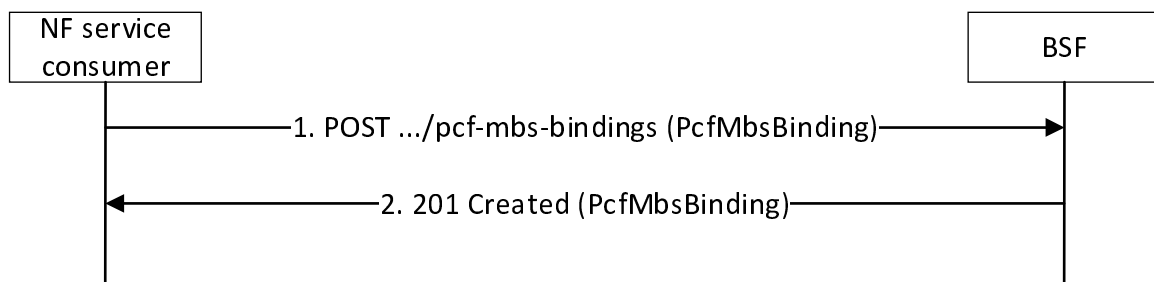


Figure 4.2.2.4-1: PCF for an MBS Session Binding information Registration procedure

1. The NF service consumer (e.g. PCF for an MBS Session) shall invoke the Nbsf_Management_Register service operation to register a new PCF for an MBS Session binding at the BSF. The NF service consumer shall send for this purpose an HTTP POST request targeting the "PCF for an MBS Session Bindings" resource URI, i.e. "{apiRoot}/nbsf-management/v1/pcf-mbs-bindings", with the request body containing the PcfMbsBinding data structure that shall include:

- the identifier of the MBS Session to which the MBS Session binding is related, within the "mbsSessionId" attribute;
- the FQDN of the PCF handling the MBS Session, if available, within the "pcfFqdn" attribute; and
- the IP end points of the PCF handling the MBS Session, if available, within the "pcfIpEndPoints" attribute;

and may include:

- the identifier of the PCF instance handling the concerned MBS Session, within the "pcfId" attribute;
- the identifier of the PCF set to which the PCF instance handling the concerned MBS Session belongs, within the "pcfSetId" attribute;
- the level of binding of the PCF handling the concerned MBS Session, within the "bindLevel" attribute; and
- the recovery timestamp of the NF service consumer (e.g. PCF for an MBS Session), within the "recoveryTime" attribute.

If the NF service consumer (e.g. PCF for an MBS Session) provides the PCF instance ID within the "pcfId" attribute, and optionally the recovery timestamp within "recoveryTime" attribute, the BSF may use this information to carry out the clean-up procedures defined in clause 6.4 of 3GPP TS 23.527 [17], if necessary.

2. Upon successful processing of the received HTTP POST request, the BSF shall check if there is an existing MBS Session Binding information with the same "mbsSessionId" attribute value. If it is the case, the the BSF shall reject the request with an HTTP "403 Forbidden" status code with the response body containing the MbsExtProblemDetails data structure that shall include the FQDN of the existing PCF within the "pcfFqdn" attribute or the description of the IP endpoints of the existing PCF within the "pcfIpEndPoints" attribute of the MbsBindingResp data structure, and the "cause" attribute of the ProblemDetails data structure set to "EXISTING_BINDING_INFO_FOUND".

If there is not existing MBS Session Binding information for the provided "mbsSessionId" attribute, the BSF shall create a new "Individual PCF for an MBS Session Binding" resource to store the requested PCF for an MBS Session binding. The BSF shall then respond to the NF service consumer with an HTTP "201 Created" status code including an HTTP Location header field containing the URI of the created "Individual PCF for an MBS Session Binding" resource, and the response body containing a representation of the created resource within the PcfMbsBinding data structure.

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

4.2.3 Nbsf_Management_Deregister Service Operation

4.2.3.1 General

This service operation allows the NF service consumer to delete existing PCF for a PDU session binding information for a UE at the BSF. It is executed by deleting the corresponding "Individual PCF for a PDU Session Binding" resource. The operation is invoked by issuing an HTTP DELETE request targeting the resource URI representing the specific PCF for a PDU session binding information that is to be deleted.

This service operation also allows the NF service consumer to delete existing PCF for a UE binding information for a UE at the BSF. It is executed by deleting the corresponding "Individual PCF for a UE Binding" resource. The operation is invoked by issuing an HTTP DELETE request targeting the resource URI representing the specific PCF for a UE binding information that is to be deleted.

This service operation also allows the NF service consumer to delete existing PCF for an MBS Session binding information for an MBS Session at the BSF. It is executed by deleting the corresponding "Individual PCF for an MBS Session Binding" resource. The operation is invoked by issuing an HTTP DELETE request targeting the resource URI representing the specific PCF for an MBS Session binding information that is to be deleted.

The following procedures using the Nbsf_Management_Deregistration service operation are supported:

- Deregister an individual PCF for a PDU Session binding information.
- Deregister an individual PCF for a UE binding information.
- Deregister an individual PCF for an MBS Session binding information.

4.2.3.2 Deregister an individual PCF for a PDU Session binding information

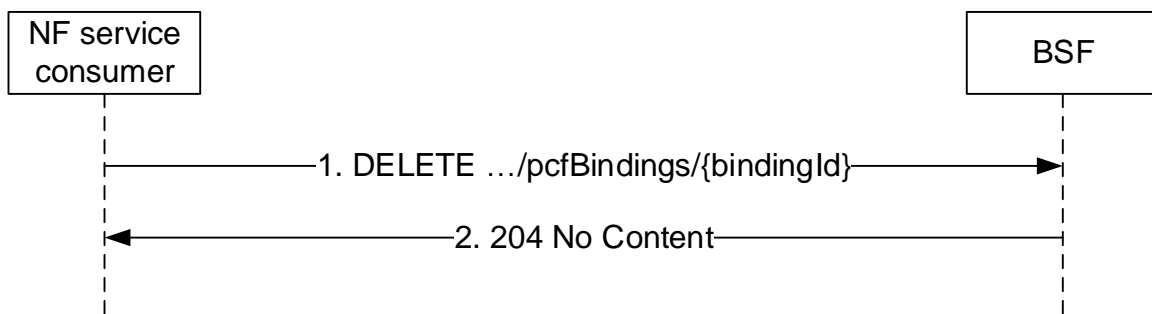


Figure 4.2.3.2-1: PCF for a PDU Session Binding Information Deregistration

The NF service consumer shall invoke the `Nbsf_Management_Deregister` service operation to deregister the PCF for a PDU session binding information for a UE in the BSF. The NF service consumer shall send an HTTP DELETE request with "`{apiRoot}/nbsf-management/<apiVersion>/pcfBindings/{bindingId}`" as Resource URI, where "`{bindingId}`" is the "Individual PCF for a PDU Session Binding" resource identifier that is to be deleted, as shown in figure 4.2.3.2-1, step 1.

Upon the reception of an HTTP DELETE request with: "`{apiRoot}/nbsf-management/<apiVersion>/pcfBindings/{bindingId}`" as Resource URI, the BSF shall:

- remove the corresponding binding information.

If the HTTP DELETE request message from the NF service consumer is accepted, the BSF shall respond with "204 No Content" status code, as shown in figure 4.2.3.2-1, step 2.

If errors occur when processing the HTTP DELETE request, the BSF shall send an HTTP error response as specified in clause 5.7.

If the Individual PCF for a PDU Session Binding resource does not exist, the BSF shall respond with "404 Not Found" error code.

If the feature "ES3XX" is supported, and the BSF determines the received HTTP DELETE request needs to be redirected, the BSF shall send an HTTP redirect response as specified in clause 6.10.9 of 3GPP TS 29.500 [6].

4.2.3.3 Deregister an individual PCF for a UE binding information

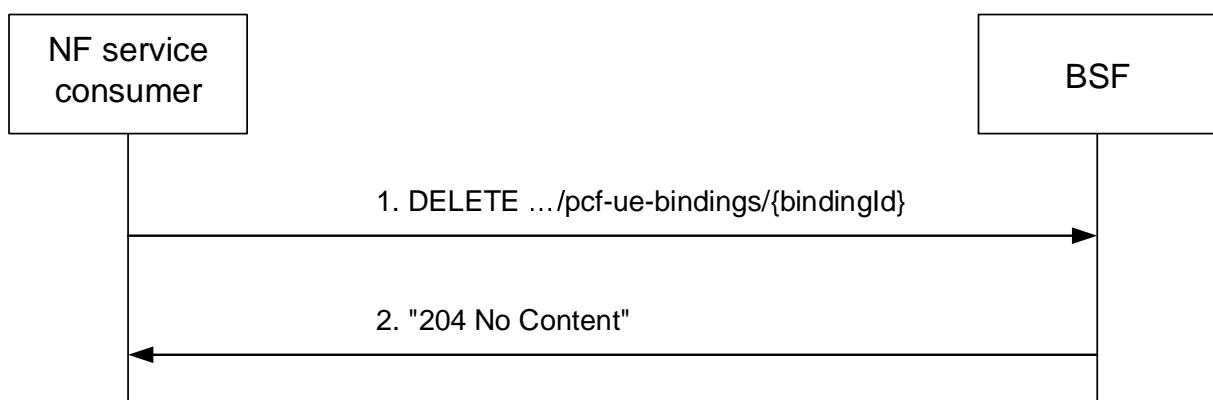


Figure 4.2.3.3-1: PCF for a UE Binding Information Deregistration

The NF service consumer shall invoke the `Nbsf_Management_Deregister` service operation to deregister the session binding information for a UE in the BSF. The NF service consumer shall send an HTTP DELETE request with "`{apiRoot}/nbsf-management/<apiVersion>/pcf-ue-bindings/{bindingId}`" as Resource URI, where "`{bindingId}`" is the "Individual PCF for a UE Binding" resource identifier that is to be deleted, as shown in figure 4.2.3.3-1, step 1.

Upon the reception of an HTTP DELETE request with: "{apiRoot}/nbsf-management/<apiVersion>/pcf-ue-bindings/{bindingId}" as Resource URI, the BSF shall:

- remove the corresponding binding information.

If the HTTP DELETE request message from the NF service consumer is accepted, the BSF shall respond with "204 No Content" status code, as shown in figure 4.2.3.3-1, step 2.

If errors occur when processing the HTTP DELETE request, the BSF shall send an HTTP error response as specified in clause 5.7.

If the Individual PCF for a UE Binding resource does not exist, the BSF shall respond with "404 Not Found" error code.

If the BSF determines the received HTTP DELETE request needs to be redirected, the BSF shall send an HTTP redirect response as specified in clause 6.10.9 of 3GPP TS 29.500 [6].

4.2.3.4 Deregister an individual PCF for an MBS Session binding information

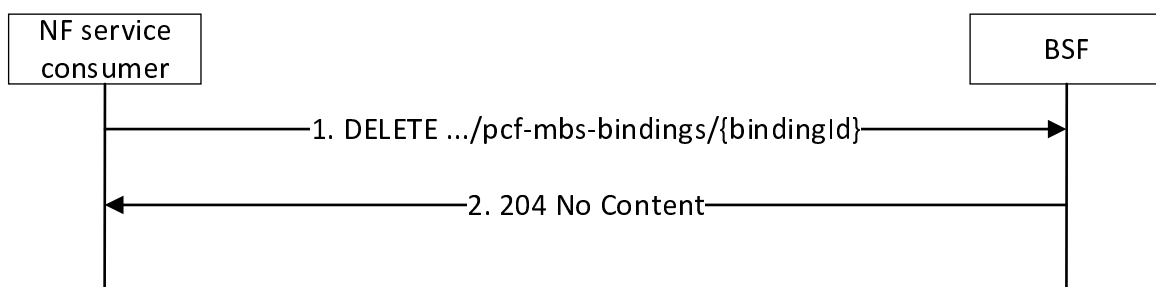


Figure 4.2.3.4-1: PCF for an MBS Session Binding information Deregistration procedure

1. The NF service consumer shall invoke the Nbsf_Management_Deregister service operation to deregister an existing PCF for an MBS Session Binding at the BSF. The NF service consumer shall send for this purpose an HTTP DELETE request targeting the URI of the concerned "Individual PCF for an MBS Session Binding" resource, i.e. "{apiRoot}/nbsf-management/<apiVersion>/pcf-mbs-bindings/{bindingId}".
2. Upon success, the BSF shall delete the concerned "Individual PCF for an MBS Session Binding" resource and respond to the NF service consumer with an HTTP "204 No Content" status code.

If errors occur when processing the HTTP DELETE request, the BSF shall apply the error handling procedures specified in subclause 5.7.

4.2.4 Nbsf_Management_Discovery Service Operation

4.2.4.1 General

This service operation allows the service consumer to use the HTTP GET method to obtain the address information of the selected PCF.

- Retrieve the PCF binding information for a PDU session.
- Retrieve the PCF binding information for a UE.
- Retrieve the PCF binding information for an MBS Session.

4.2.4.2 Retrieve the PCF binding information for a PDU session

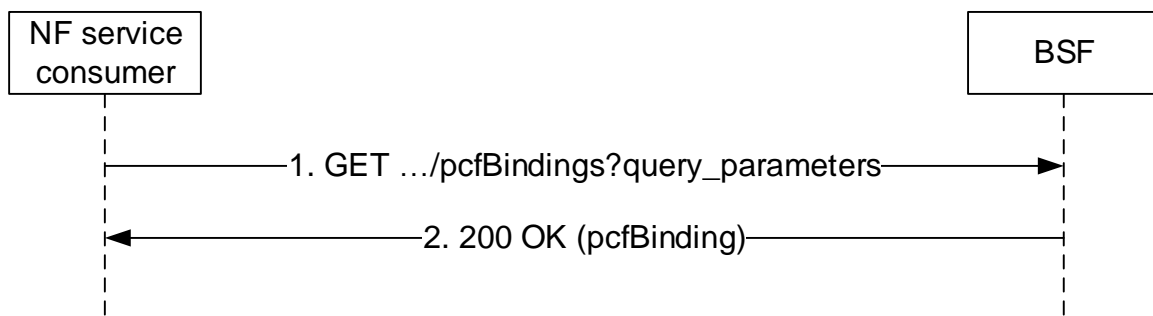


Figure 4.2.4.2-1: NF service consumer retrieve the PCF binding information for a PDU session

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/<apiVersion>/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/<apiVersion>/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 binding information for a PDU session matching the query parameters, the BSF shall respond with an HTTP "204 No Content".

NOTE 2: The NF service consumer (such as the AF or NEF) uses the PCF binding information as described in 3GPP TS 29.513 [5] clause 8.4.2 (see bullets d) and e) in that clause). 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] clause 8.4.2.

If the "PCF for a PDU 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 Individual PCF for a PDU 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.

4.2.4.3 Retrieve the PCF binding information for a UE

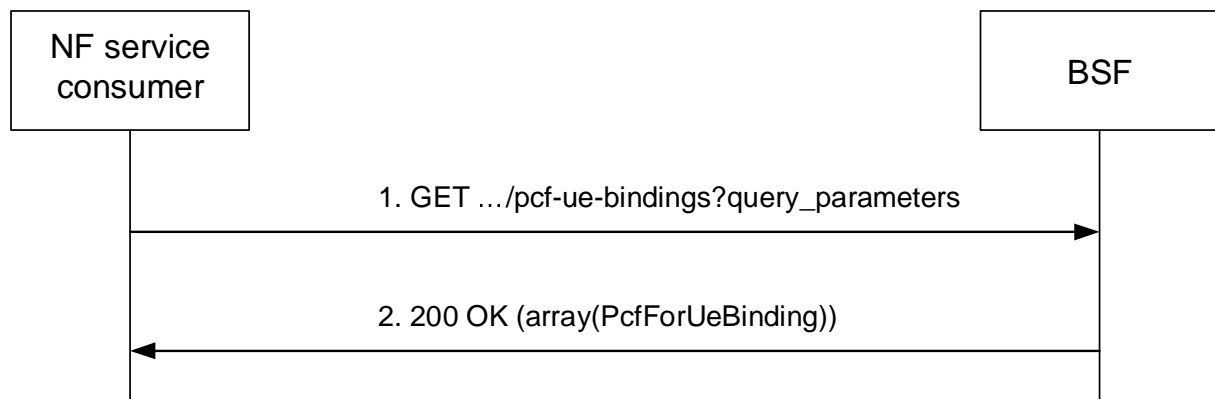


Figure 4.2.4.3-1: NF service consumer retrieve the PCF binding information for a UE

The NF service consumer shall invoke the `Nbsf_Management_Discovery` service operation to obtain address information of the selected PCF for a UE in the BSF. The NF service consumer shall send an HTTP GET request with "`{apiRoot}/nbsf-management/<apiVersion>/pcf-ue-bindings`" as Resource URI, and "query parameters" that shall include:

- SUPI and/or GPSI;

Upon the reception of an HTTP GET request with: "`{apiRoot}/nbsf-management/<apiVersion>/pcf-ue-bindings`" as Resource URI, the BSF shall search the corresponding binding information.

If the HTTP request message from the NF service consumer is accepted and a binding resource matching the query parameters exists, the BSF shall reply with an HTTP "200 OK" response, as shown in figure 4.2.4.3-1, step 2, containing the corresponding "PcfForUeBinding" data structure(s), 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 binding information for a UE matching the query parameters, the BSF shall respond with an HTTP "200 OK" response with an empty array (i.e. "`[]`" in JSON).

NOTE: 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] clause 6.2.

4.2.4.4 Retrieve the PCF binding information for an MBS Session

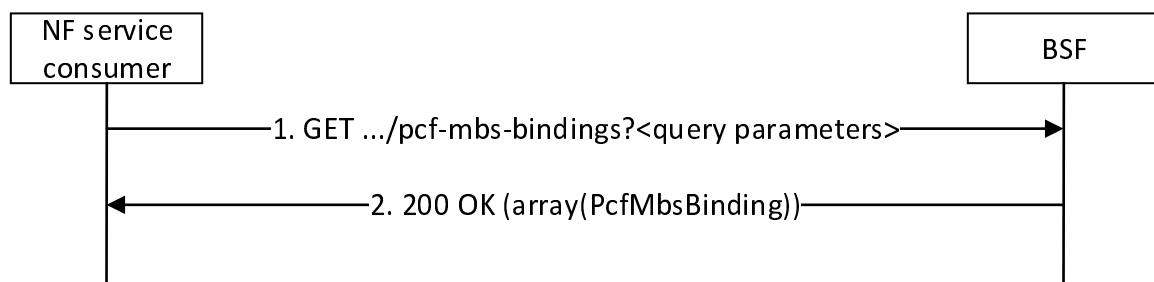


Figure 4.2.4.4-1: PCF for an MBS Session Binding Retrieval procedure

1. The NF service consumer (e.g. NEF, MBSF, AF) shall invoke the `Nbsf_Management_Discovery` service operation to obtain from the BSF the addressing information of the selected PCF for an MBS Session. The NF service consumer shall send for this purpose an HTTP GET request targeting the "PCF for an MBS Session Bindings" resource URI, i.e. "`{apiRoot}/nbsf-management/<apiVersion>/pcf-mbs-bindings`", which shall include the following query parameters:

- the identifier of the MBS Session to which the requested MBS Session binding is related, within the "mbs-session-id" query parameter.

2. Upon the reception of an HTTP GET request with: "{apiRoot}/nbsf-management/<apiVersion>/pcf-mbs-bindings" as Resource URI, the BSF shall search the corresponding binding information. If the HTTP GET request from the NF service consumer is accepted and a corresponding "Individual PCF for an MBS Session Binding" resource matching the provided query parameters exists, the BSF shall respond with an HTTP "200 OK" response, as shown in figure 4.2.4.4-1, step 2, containing the corresponding "PcfMbsBinding" 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 binding information for a UE matching the query parameters, the BSF shall respond with an HTTP "200 OK" response with an empty array (i.e. "[]" in JSON).

NOTE: If the NF service consumer (such as the AF, NEF or MBSF) 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 clause 8.6 of 3GPP TS 29.513 [5].

If errors occur when processing the HTTP GET request, the BSF shall apply the error handling procedures, as specified in clause 5.7.

If an invalid combination of query parameters (i.e. a combination without MBS Session Id) 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 Individual PCF for an MBS 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.

If the "PCF for an MBS Session Bindings" resource does not exist, the BSF shall respond with a "404 Not Found" HTTP error code.

4.2.5 Nbsf_Management_Update Service Operation

4.2.5.1 General

This service operation allows the NF service consumer to update an existing PCF for a PDU session binding information for a UE in the BSF by providing the information to be updated (e.g. the UE address(es)), and the BSF updates the PDU session binding information.

This service operation also allows the NF service consumer to update an existing PCF for a UE binding information for a UE in the BSF by providing the information to be updated (e.g. PCF instance, and related PCF address), and the BSF updates the UE binding information.

This service operation also allows the NF service consumer to update an existing PCF for an MBS Session binding information for an MBS Session at the BSF by providing the information to be updated (e.g. PCF instance, PCF addresses), and the BSF update the MBS session binding information.

The following procedures using the Nbsf_Management_Update service operation are supported:

- Update an existing PCF for a PDU Session binding information.
- Update an existing PCF for a UE binding information.
- Update an existing PCF for an MBS Session binding information.

4.2.5.2 Update an existing PCF for a PDU Session binding information

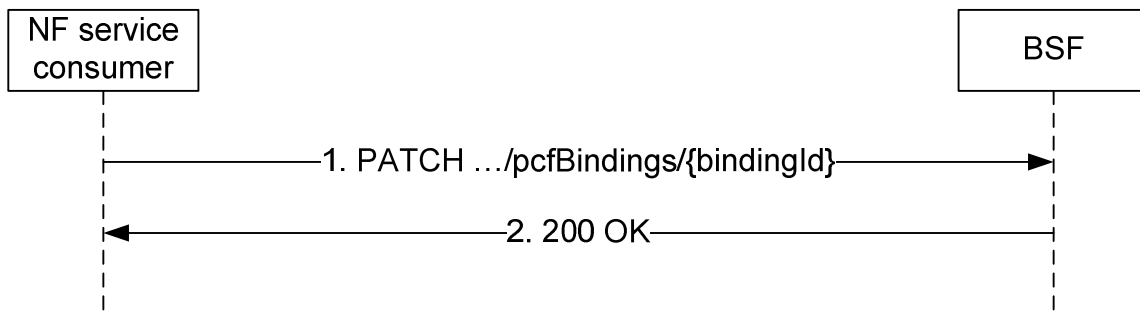


Figure 4.2.5.2-1: NF service consumer update an existing PCF for a PDU Session binding information

If the feature "BindingUpdate" is supported, the NF service consumer shall invoke the `Nbsf_Management_Update` service operation to update PCF for a PDU the session binding information for a UE in the BSF. The NF service consumer shall send an HTTP PATCH request with "`{apiRoot}/nbsf-management/<apiVersion>/pcfBindings/{bindingId}`" as Resource URI, where "`{bindingId}`" is the "Individual PCF for a PDU Session Binding" resource identifier that is to be updated, as shown in figure 4.2.5.2-1, step 1. The "PcfBindingPatch" data structure provided in the request body shall contain the information to be updated as follows.

The "PcfBindingPatch" data structure:

- for the IP address information of the served UE:
 - a) shall contain the "ipv4Addr" attribute if the IPv4 address is modified, or if the "ExtendedSamePcf" feature is supported, if the IPv4 address was not previously provided, and may contain the "ipDomain" attribute if the IPv4 address domain is modified or if the "ExtendedSamePcf" feature is supported, if the IPv4 address domain was not previously provided and applies. To remove the IPv4 address the "ipv4Addr" attribute shall be set to "null" and if applicable, the "ipDomain" attribute shall be set to "null"; and/or
 - b) shall contain the "ipv6Prefix" attribute if the IPv6 address information is modified, or if the "ExtendedSamePcf" feature is supported, if the IPv6 address information was not previously provided. The "ipv6Prefix" attribute shall be set to "null" if the IPv6 address information is removed; and/or
 - c) if the "MultiUeAddr" feature is supported, shall contain:
 - 1) the "addIpv6Prefixes" attribute containing the new complete list of additional IPv6 Address Prefixes if the additional IPv6 address information is modified, or if the "ExtendedSamePcf" feature is supported, the current list of IPv6 address prefixes if it was not previously provided; or
 - 2) the "addIpv6Prefixes" attribute set to "null" if all additional IPv6 Address Prefixes are removed; or
- for the MAC address information of the served UE:
 - a) shall contain the "macAddr48" attribute if the MAC address is modified, or if the "ExtendedSamePcf" feature is supported, if the MAC address was not previously provided. The "macAddr48" attribute shall be set to "null" if the MAC address is removed; and/or
 - b) if the "MultiUeAddr" feature is supported, shall contain:
 - 1) the "addMacAddrs" attribute containing the new complete list of additional MAC addresses if the additional MAC address information is modified, or if the "ExtendedSamePcf" feature is supported, the current list of MAC address(es) if it was not previously provided; or
 - 2) the "addMacAddrs" attribute set to "null" if all additional MAC addresses are removed; or
- for the PCF instance and the associated PCF address information of the PCF holding the SM policy association, should contain if a new PCF instance is selected:
 - a) the PCF instance ID encoded as "pcfId" attribute;
 - b) if the PCF supports the `Npcf_PolicyAuthorization` service:

- 1) the FQDN of the PCF encoded as "pcfFqdn" attribute; and/or
 - 2) a description of IP endpoints at the PCF hosting the Npcf_PolicyAuthorization service encoded as "pcfIpEndPoints" attribute; and/or
- c) if the PCF supports the Rx interface:
- 1) the Diameter host id of the PCF encoded as "pcfDiamHost"; and
 - 2) the Diameter realm of the PCF and "pcfDiamRealm" attributes.

If the BSF cannot successfully fulfil the received HTTP PATCH request due to the internal BSF error or due to the error in the HTTP PATCH request, the BSF shall send the HTTP error response as specified in clause 5.7.

Otherwise, upon the reception of the HTTP PATCH request with: "{apiRoot}/nbsf-management/<apiVersion>/pcfBindings/{bindingId}" as Resource URI and the "PcfBindingPatch" data structure as request body, the BSF shall update the binding information.

If the BSF successfully updated an "Individual PCF for a PDU Session Binding" resource, the BSF shall respond with "200 OK" status code with the message body containing the resource representation with the updated PCF for a PDU session binding information in the "PcfBinding" data structure, as shown in figure 4.2.5.2-1, step 2.

If errors occur when processing the HTTP PATCH request, the BSF shall send an HTTP error response as specified in clause 5.7.

If the feature "ES3XX" is supported, and the BSF determines the received HTTP PATCH request needs to be redirected, the BSF shall send an HTTP redirect response as specified in clause 6.10.9 of 3GPP TS 29.500 [6].

4.2.5.3 Update an existing PCF for a UE binding information

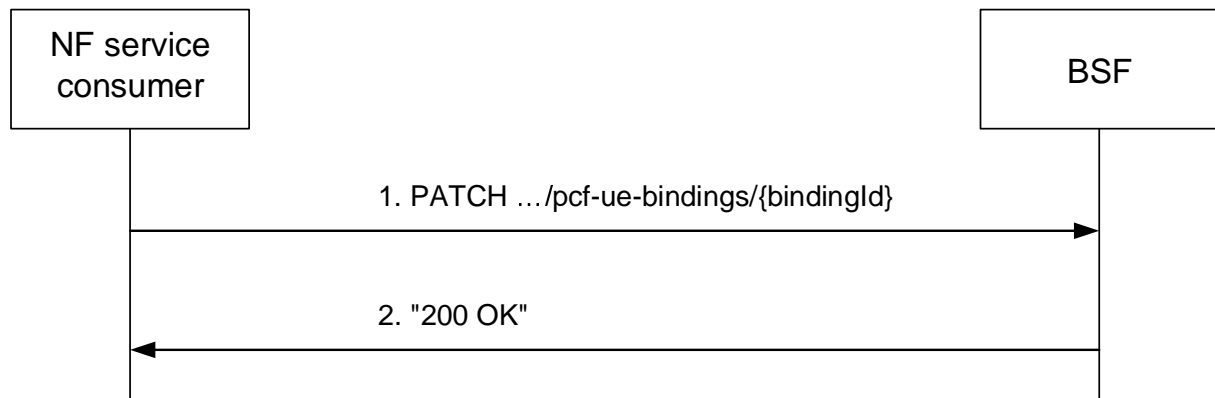


Figure 4.2.5.3-1: NF service consumer update an existing PCF for a UE binding information

The NF service consumer shall invoke the Nbsf_Management_Update service operation to update the PCF for a UE binding information for a UE in the BSF. The NF service consumer shall send an HTTP PATCH request with "{apiRoot}/nbsf-management/<apiVersion>/pcf-ue-bindings/{bindingId}" as Resource URI, where "{bindingId}" is the "Individual PCF for a UE Binding" resource identifier that is to be updated, as shown in figure 4.2.5.3-1, step 1. The "PcfForUeBindingPatch" data structure provided in the request body shall contain the information to be updated as follows.

The "PcfForUeBindingPatch" data structure, for the PCF instance and the associated PCF address information of the PCF holding the AM policy association, shall contain if a new PCF instance is selected:

- a) the PCF instance ID encoded as "pcfId" attribute; and
- b) if the PCF supports the Npcf_AMPolicyAuthorization service, the Npcf_AMPolicyAuthorization service address information consisting of:
 - 1) the FQDN of the PCF encoded as "pcfForUeFqdn" attribute; and/or

- 2) a description of IP endpoints at the PCF hosting the Npcf_AMPolicyAuthorization service encoded as "pcfForUeIpEndPoints" attribute.

NOTE: In this release of the specification the PCF for a UE registering the binding information in the BSF supports the Npcf_AMPolicyAuthorization service.

If the BSF cannot successfully fulfill the received HTTP PATCH request due to the internal BSF error or due to the error in the HTTP PATCH request, the BSF shall send the HTTP error response as specified in clause 5.7.

Otherwise, upon the reception of the HTTP PATCH request with: "{apiRoot}/nbsf-management/<apiVersion>/pcf-ue-bindings/{bindingId}" as Resource URI and the "PcfForUeBindingPatch" data structure as request body, the BSF shall update the binding information.

If the BSF successfully updated an "Individual PCF for a UE Binding" resource, the BSF shall respond with "200 OK" status code with the message body containing the resource representation with the updated PCF for a UE binding information in the "PcfForUeBinding" data structure, as shown in figure 4.2.5.3-1, step 2.

If the BSF determines the received HTTP PATCH request needs to be redirected, the BSF shall send an HTTP redirect response as specified in clause 6.10.9 of 3GPP TS 29.500 [6].

4.2.5.4 Update an existing PCF for an MBS Session binding information

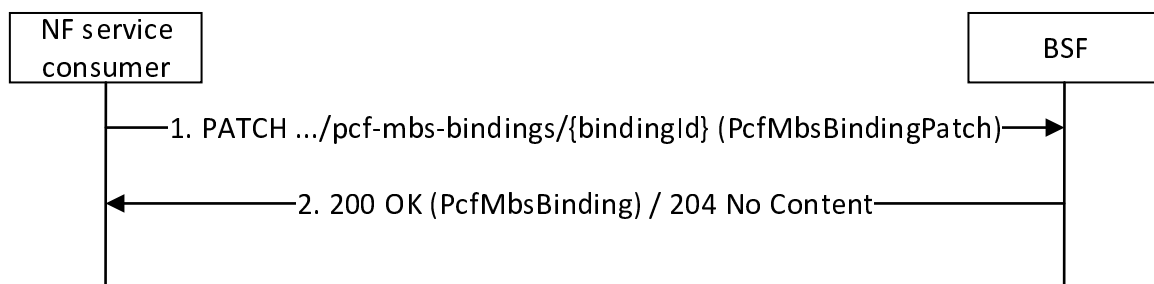


Figure 4.2.5.4-1: NF service consumer updates an existing PCF for an MBS Session binding information

1. The NF service consumer (e.g. PCF handling the MBS Session) shall invoke the Nbsf_Management_Update service operation to request the modification of an existing PCF for an MBS Session binding information for an MBS Session at the BSF. The NF service consumer shall send for this purpose an HTTP PATCH request targeting the URI of the concerned "Individual PCF for an MBS Session Binding" resource, i.e. "{apiRoot}/nbsf-management/<apiVersion>/pcf-mbs-bindings/{bindingId}", with the request body containing the PcfMbsBindingPatch data structure including the requested modifications.
2. Upon successful modification of the PCF for an MBS Session binding, the BSF shall respond with either:
 - an HTTP "200 OK" status code with the response body containing a representation of the updated "Individual PCF for an MBS Session Binding" resource within the PcfMbsBinding data structure; or
 - an HTTP "204 No Content" status code.

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

4.2.6 Nbsf_Management_Subscribe Service Operation

4.2.6.1 General

This service operation is used by an NF service consumer to subscribe to the notifications of registration/deregistration events for the PCF for a PDU Session or PCF for a UE.

The following procedures using the Nbsf_Management_Subscribe service operation are supported:

- Creating a new subscription;
- Modifying an existing subscription.

4.2.6.2 Creating a new subscription

Figure 4.2.6.2-1 illustrates the creation of a subscription.

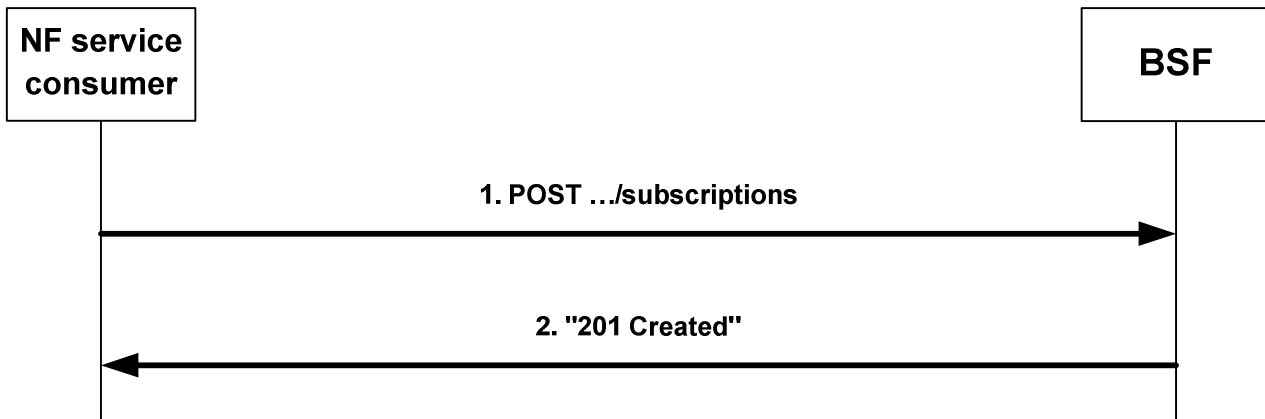


Figure 4.2.6.2-1: Creation of a subscription

To subscribe to event notifications, the NF service consumer shall send an HTTP POST request with: "{apiRoot}/nbsf-management/<apiVersion>/subscriptions" as Resource URI and the BsfSubscription data structure as request body that shall include:

- an URI where to receive the requested notifications within the "notifUri" attribute;
- a Notification Correlation Identifier provided by the NF service consumer for the requested notifications within the "notifCorreId" attribute;
- identification of the events to subscribe as "events" attribute;
- the SUPI within the "supi" attribute;
- if the NF service consumer subscribes to event notifications of newly registered and deregistered PCF for a PDU session, the "events" attribute indicating "PCF_PDU_SESSION_BINDING_REGISTRATION"/"PCF_PDU_SESSION_BINDING_DEREGISTRATION" and/or subscribes to the event notifications of binding registration of the first PDU session and deregistration of the last PDU session for a S-NSSAI and DNN combination indicating "SNSSAI_DNN_BINDING_REGISTRATION"/"SNSSAI_DNN_BINDING_DEREGISTRATION" respectively, and one DNN and S-NSSAI pair to which the subscription applies within the "snssaiDnnPairs" attribute and, when the subscription applies to more than one DNN and S-NSSAI, the list of the remaining DNN and S-NSSAI pairs to which the subscription applies within the "addSnssaiDnnPairs" attribute, which includes the DNN within the "dnn" attribute and the S-NSSAI within the "snssai" attribute;

NOTE 1: When the subscribed event is SNSSAI_DNN_BINDING_REGISTRATION and SNSSAI_DNN_BINDING_DEREGISTRATION, only the status of the binding for the concerned S-NSSAI and DNN combination is reported, i.e., it is not needed to report the complete binding related information, but only an indication of registration or deregistration event.

- if the NF service consumer subscribes to event notifications of newly registered and deregistered PCF for a UE, the "events" attribute indicating "PCF_UE_BINDING_REGISTRATION"/"PCF_UE_BINDING_DEREGISTRATION".

The BsfSubscription data structure as request body may also include:

- the GPSI within the "gpsi" attribute.

If the BSF cannot successfully fulfil the received HTTP POST request due to an internal BSF error or an error in the HTTP POST request, the PCF shall send an HTTP error response as specified in clause 5.7.

Upon successful reception of the HTTP POST request with "{apiRoot}/nbsf-management/<apiVersion>/subscriptions" as request URI and "BsfSubscription" data structure as request body, the BSF shall create a new "Individual Binding Subscription" resource, store the subscription and send a HTTP "201 Created" response as shown in figure 4.2.6.2-1, step 2. The BSF shall include in the "201 Created" response:

- a Location header field; and
- a "BsfSubscriptionResp" data type in the payload body.

The Location header field shall contain the URI of the created individual application session context resource i.e., "{apiRoot}/nbsf-management/<apiVersion>/subscriptions/{subId}".

The "BsfSubscriptionResp" data type shall contain:

- the representation of the created "Individual Binding Subscription" resource within the "BsfSubscription" data type; and
- when the BSF already has available the requested information at the time of the event subscription request, the related notification information within the "BsfNotification" data type as specified in clause 4.2.8.2.

The subscription to any event lasts till the NF service consumer terminates it as described in subclause 4.2.7.2. For every subscribed event, the continuous reporting notification method shall apply.

4.2.6.3 Modifying an existing subscription

Figure 4.2.6.3-1 illustrates the modification of an existing subscription.

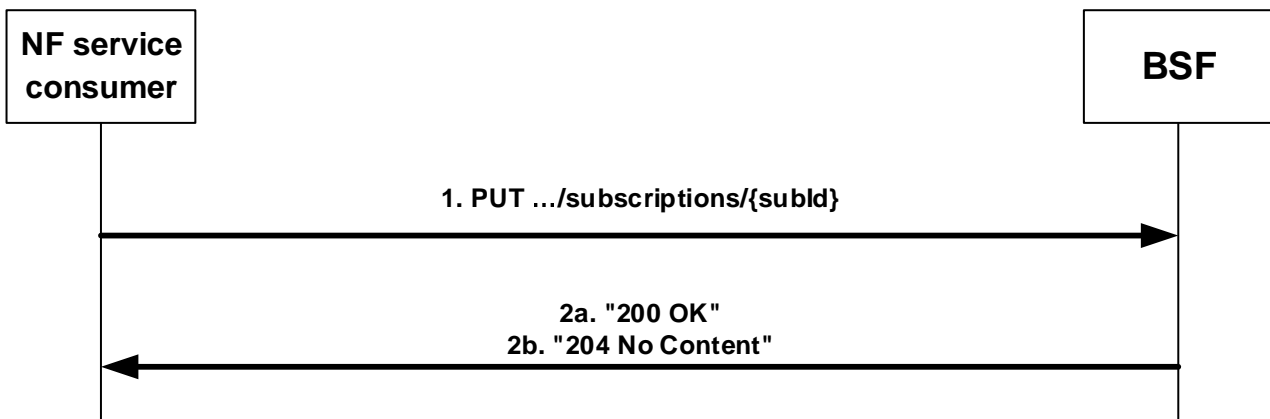


Figure 4.2.6.3-1: Modification of an existing subscription

To modify an existing subscription to event notifications, the NF service consumer shall send an HTTP PUT request with: "{apiRoot}/nbsf-management/<apiVersion>/subscriptions/{subId}" as Resource URI, where "{subId}" is the subscription correlation ID of the existing subscription, and BsfSubscription data structure as request body as described in clause 4.2.6.2.

NOTE 1: The "notifUri" attribute within the BsfSubscription data structure can be modified to request that subsequent notifications are sent to a new NF service consumer.

NOTE 2: This service operation does not allow the unsubscription of all subscribed events. The unsubscription of all subscribed events is described in clause 4.2.7.2.

Upon the reception of an HTTP PUT request with: "{apiRoot}/nbsf-management/<apiVersion>/subscriptions/{subId}" as Resource URI and BsfSubscription data structure as request body, if the received HTTP request is successfully processed and accepted, the BSF shall:

- update the concerned subscription; and

- send an HTTP "200 OK" response with a response body containing a representation of the updated subscription in the BsfSubscriptionResp data structure or send an HTTP "204 No Content".

If errors occur when processing the HTTP PUT request, the BSF shall send an HTTP error response as specified in clause 5.7.

If the BSF determines the received HTTP PUT request needs to be redirected, the BSF shall send an HTTP redirect response as specified in clause 6.10.9 of 3GPP TS 29.500 [5].

4.2.7 Nbsf_Management_Unsubscribe Service Operation

4.2.7.1 General

This service operation is used by an NF service consumer to unsubscribe from event notifications.

The following procedure using the Nbsf_Management_Unsubscribe service operation is supported:

- Unsubscription from event notifications.

4.2.7.2 Unsubscription from event notifications

Figure 4.2.7.2-1 illustrates the unsubscription from event notifications.

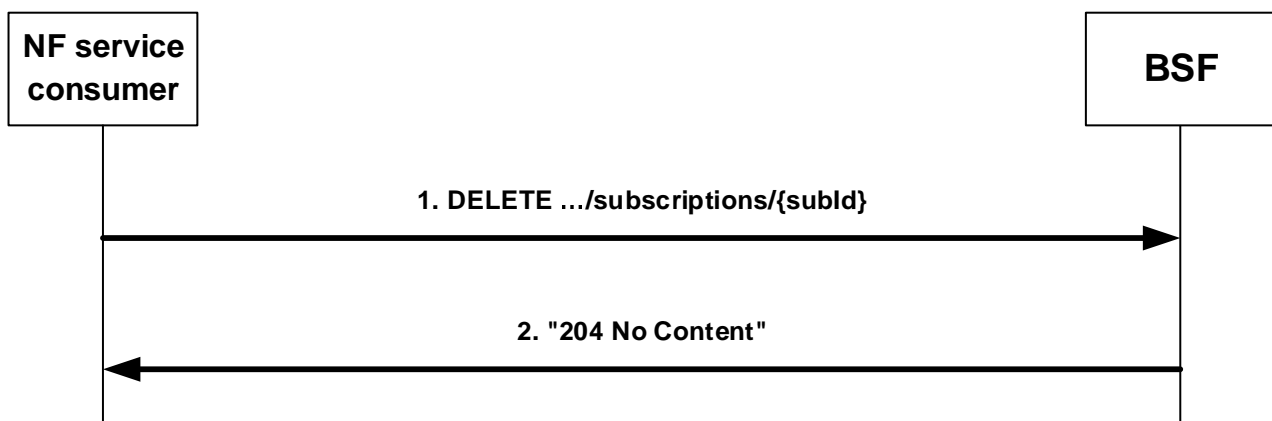


Figure 4.2.7.2-1: Unsubscription from event notifications

To unsubscribe from all event(s) notifications, the NF service consumer shall send an HTTP DELETE request with: "{apiRoot}/nbsf-management/<apiVersion>/subscriptions/{subId}" as Resource URI, where "{subId}" is the subscription correlation ID of the existing subscription that is to be deleted.

Upon the reception of the HTTP DELETE request with: "{apiRoot}/nbsf-management/<apiVersion>/subscriptions/{subId}" as Resource URI, if the received HTTP request is successfully processed and accepted, the BSF shall:

- remove the corresponding subscription; and
- send an HTTP "204 No Content" response.

If errors occur when processing the HTTP DELETE request, the BSF shall send an HTTP error response as specified in clause 5.7.

If the BSF determines the received HTTP DELETE request needs to be redirected, the BSF shall send an HTTP redirect response as specified in clause 6.10.9 of 3GPP TS 29.500 [5].

4.2.8 Nbsf_Management_Notify Service Operation

4.2.8.1 General

The Nbsf_Management_Notify service operation enables the BSF to send notifications to NF service consumers upon the occurrence of a previously subscribed event.

The following procedure using the Nbsf_Management_Notify service operation is supported:

- Notification about subscribed events.

4.2.8.2 Notification about subscribed events

The present "notification about subscribed events" procedure is performed by the BSF when any of the subscribed events occur.

Figure 4.2.8.2-1 illustrates the notification about subscribed events.

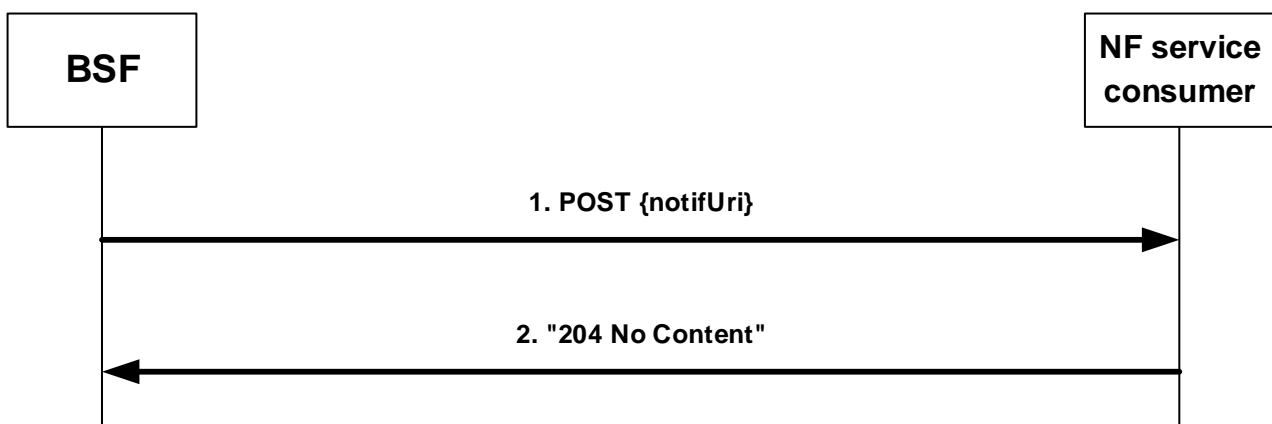


Figure 4.2.8.2-1: Notification about subscribed events

If the BSF observes event(s) for which an NF service consumer has subscribed, the BSF shall send an HTTP POST request as shown in figure 4.2.8.2-1, step 1, with the "{notifUri}" as request URI containing the value previously provided by the NF service consumer within the corresponding subscription, and the BsfNotification data structure.

The BsfNotification data structure shall include:

- the notification correlation ID provided by the NF service consumer during the subscription within "notifCorreId" attribute;
- the list of the reported events within the "eventNotifs" attribute. For each reported event, the BsfEventNotification data type shall include the event identifier and may include additional event information.

Within each instance of BsfEventNotification data type, the BSF shall include:

- When a subscription to "PCF_PDU_SESSION_BINDING_REGISTRATION" and "PCF_PDU_SESSION_BINDING_DEREGISTRATION" exists:
 - a. When the BSF detects the registration of a PCF for a PDU session for a DNN and S-NSSAI, SUPI, and GPSI, if available, matching one of the DNN, S-NSSAI pairs, the SUPI and the GPSI, if available, provided during subscription, the BSF shall set the "event" attribute to "PCF_PDU_SESSION_BINDING_REGISTRATION" and shall include the "pcfForPduSessInfos" with the binding information of the detected PDU session.
 - b. When the PCF detects the deregistration of a PCF for a PDU session for a DNN and S-NSSAI, SUPI, and GPSI, if available, matching one of the DNN, S-NSSAI pairs, the SUPI and the GPSI, if available, provided during subscription, the BSF shall set the "event" attribute to "PCF_PDU_SESSION_BINDING_DEREGISTRATION" and shall include the "pcfForPduSessInfos" with the binding information of the of the removed PDU session.

- When a subscription to "PCF_UE_BINDING_REGISTRATION" and "PCF_UE_BINDING_DEREGISTRATION" exists:
 - a. When the BSF detects the registration of a PCF for a UE for a SUPI and, if available, GPSI matching the SUPI and, if available, GPSI provided during subscription, the BSF shall set the "event" attribute to "PCF_UE_BINDING_REGISTRATION" and shall include the "pcfForUeInfo" with the binding information of the detected UE.
 - b. When the BSF detects the deregistration of a PCF for a UE for a SUPI and, if available, GPSI matching the SUPI and, if available, GPSI provided during subscription, the BSF shall set the "event" attribute to "PCF_UE_BINDING_DEREGISTRATION" and shall include the "pcfForUeInfo" with the binding information of the removed UE.
- When a subscription to "SNSSAI_DNN_BINDING_REGISTRATION" and "SNSSAI_DNN_BINDING_DEREGISTRATION" exists:
 - a. When the BSF detects the registration of PCF for a PDU session for a DNN and S-NSSAI, SUPI, and GPSI, if available, matching one of the DNN, S-NSSAI pairs, the SUPI and the GPSI, if available, provided during subscription, and this is the first PDU session for the DNN and S-NSSAI, SUPI, and GPSI, if available, combination, the BSF shall set the "event" attribute to "SNSSAI_DNN_BINDING_REGISTRATION" and the "matchSnsaiDnns" attribute with the matching S-NSSAI and DNN pairs.
 - b. When the BSF detects the deregistration of PCF for a PDU session for a DNN and S-NSSAI, SUPI, and GPSI, if available, matching one of the DNN, S-NSSAI pairs, the SUPI and the GPSI, if available, provided during subscription, and this is the last PDU session for the DNN and S-NSSAI, SUPI, and GPSI, if available, combination, the BSF shall set the "event" attribute to "SNSSAI_DNN_BINDING_DEREGISTRATION" and the removed S-NSSAI and DNN combinations within the "matchSnsaiDnns" attribute.

If the HTTP POST request from the BSF is accepted, the NF service consumer shall acknowledge the receipt of the event notification with a "204 No Content" response to HTTP POST request, as shown in figure 4.2.8.2-1, step 2.

If the HTTP POST request from the BSF is not accepted, the NF service consumer shall indicate in the response to HTTP POST request the cause for the rejection as specified in clause 5.7. If the NF service consumer determines the received HTTP POST request needs to be redirected, the NF service consumer shall send an HTTP redirect response as specified in clause 6.10.9 of 3GPP TS 29.500 [5].

5 Nbsf_Management Service API

5.1 Introduction

The Nbsf_Management Service shall use the Nbsf_Management API.

The API URI of the Nbsf_Management API shall be:

{apiRoot}/<apiName>/<apiVersion>

The request URIs used in HTTP requests from the NF service consumer towards the BSF shall have the Resource URI structure defined in clause 4.4.1 of 3GPP TS 29.501 [7], i.e.:

{apiRoot}/<apiName>/<apiVersion>/<apiSpecificResourceUriPart>

with the following components:

- The {apiRoot} shall be set as described in 3GPP TS 29.501 [7].
- The <apiName> shall be "nbsf-management".
- The <apiVersion> shall be "v1".
- The <apiSpecificResourceUriPart> shall be set as described in clause 5.3.

5.2 Usage of HTTP

5.2.1 General

HTTP/2, IETF RFC 7540 [8], shall be used as specified in clause 5 of 3GPP TS 29.500 [6].

HTTP/2 shall be transported as specified in clause 5.3 of 3GPP TS 29.500 [6].

The OpenAPI [11] specification of HTTP messages and content bodies for the Nbsf_Management is contained in Annex A.

5.2.2 HTTP standard headers

5.2.2.1 General

See clause 5.2.2 of 3GPP TS 29.500 [6] for the usage of HTTP standard headers.

5.2.2.2 Content type

JSON, IETF RFC 8259 [9], shall be used as content type of the HTTP bodies specified in the present specification as specified in clause 5.4 of 3GPP TS 29.500 [6]. The use of the JSON format shall be signalled by the content type "application/json".

"Problem Details" JSON object shall be used to indicate additional details of the error in a HTTP response body and shall be signalled by the content type "application/problem+json", as defined in IETF RFC 7807 [13].

JSON object used in the HTTP PATCH request shall be encoded according to "JSON Merge Patch" and shall be signalled by the content type "application/merge-patch+json", as defined in IETF RFC 7396 [20].

5.2.3 HTTP custom headers

5.2.3.1 General

The Nbsf_Management Service API shall support the mandatory HTTP custom header fields specified in clause 5.2.3.2 of 3GPP TS 29.500 [6] and may support the optional HTTP custom header fields specified in clause 5.2.3.3 of 3GPP TS 29.500 [6].

In this release of the specification, no specific custom headers are defined for the Nbsf_Management Service API.

5.3 Resources

5.3.1 Resource Structure

This clause describes the structure for the Resource URIs, the resources and methods used for the service.

The structure of the Resource URI of the Nbsf_Management service is shown in figure 5.3.1-1.

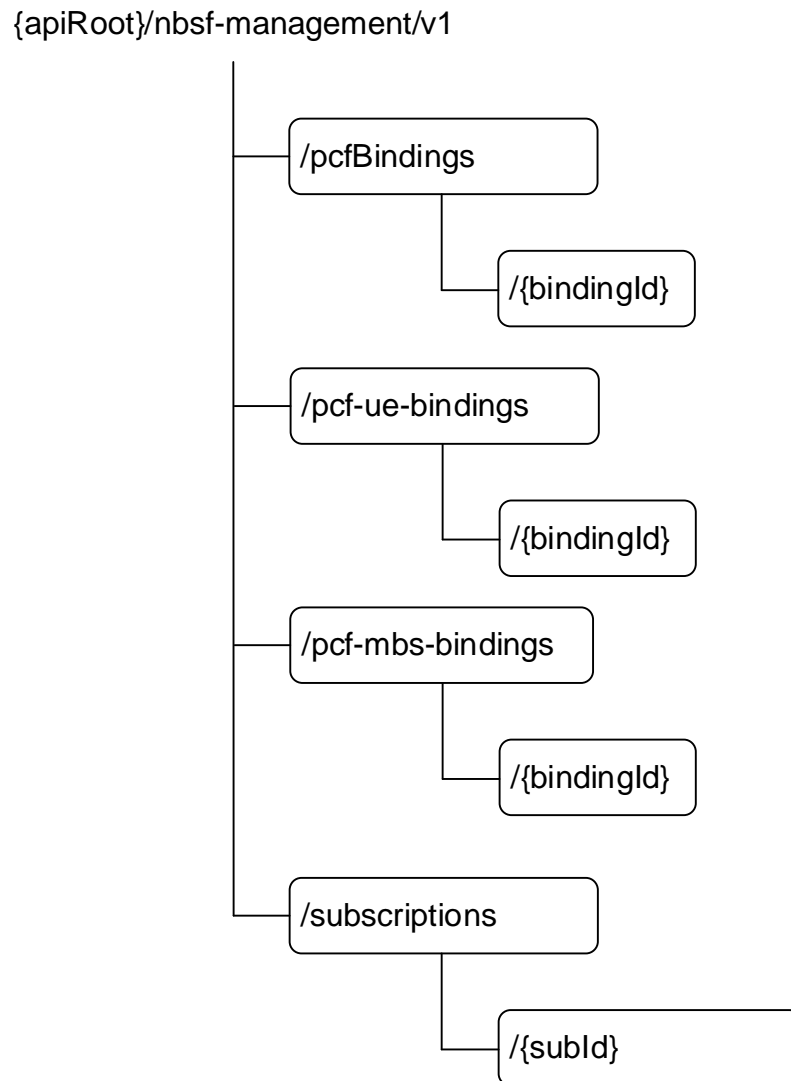


Figure 5.3.1-1: Resource URI structure of the Nbsf_Management API

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 for a PDU Session Bindings	/pcfBindings (NOTE)	POST	Register a new PCF for a PDU Session binding information of a given UE address in the BSF.
		GET	Retrieve the PCF for a PDU Session binding information i.e. PCF address information of a given tuple (UE address, SUPI; GPSI, DNN, S-NSSAI).
Individual PCF for a PDU Session Binding	/pcfBindings/{bindingId} (NOTE)	DELETE	Deregister an existing PCF for a PDU Session binding information from the BSF.
		PATCH	Update an existing PCF for a PDU Session binding information in the BSF.
PCF for a UE Bindings	/pcf-ue-bindings	POST	Register a new PCF for a UE binding information of a given UE identity in the BSF.
		GET	Retrieve the PCF for a UE binding information i.e. PCF address information of a UE.
Individual PCF for a UE Binding	pcf-ue-bindings/{bindingId}	DELETE	Deregister an existing PCF for a UE binding information from the BSF.
		PATCH	Update an existing PCF for a UE binding information in the BSF.
PCF for an MBS Session Bindings	/pcf-mbs-bindings	POST	Register a new PCF for an MBS Session Binding.
		GET	Retrieve PCF for an MBS Session Binding information.
Individual PCF for an MBS Session Binding	/pcf-mbs-bindings/{bindingId}	PATCH	Modify an existing PCF for an MBS Session Binding.
		DELETE	Deregister an existing PCF for an MBS Session Binding.
Binding Subscriptions	/subscriptions	POST	Create a new Individual Binding Subscription resource.
Individual Binding Subscription	/subscriptions/{subId}	PUT	Modify an existing Individual Binding Subscription resource.
		DELETE	Delete an Individual Binding Subscription resource and cancel the related subscription.
NOTE:	The path segment does not follow the related naming convention defined in 3GPP TS 29.501 [7]. The path segment is kept though as defined in the current specification for backward compatibility considerations.		

5.3.2 Resource: PCF for a PDU Session Bindings

5.3.2.1 Description

This resource represents a collection of the different PCF for a PDU Session binding information of given UE address(es) registered in the BSF.

5.3.2.2 Resource definition

Resource URI: {apiRoot}/nbsf-management/<apiVersion>/pcfBindings

The <apiVersion> shall be set as described in clause 5.1.

This resource shall support the resource URI variables defined in table 5.3.2.2-1.

Table 5.3.2.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 5.1

5.3.2.3 Resource Standard Methods

5.3.2.3.1 POST

This method shall support the URI query parameters specified in table 5.3.2.3.1-1.

Table 5.3.2.3.1-1: URI query parameters supported by the POST method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in table 5.3.2.3.1-2 and the response data structures and response codes specified in table 5.3.2.3.1-3.

Table 5.3.2.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
PcfBinding	M	1	Register a new Individual PCF for a PDU Session binding information.

Table 5.3.2.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
PcfBinding	M	1	201 Created	The creation of an individual PCF for a PDU Session binding.
ExtProblemDetails	O	0..1	403 Forbidden	The existing PCF binding information stored in the BSF for the indicated combination is returned.
NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [6] shall also apply.				

Table 5.3.2.3.1-4: Headers supported by the 201 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains the URI of the newly created resource, according to the structure: {apiRoot}/nbsf-management/<apiVersion>/pcfBindings/{bindingId}

5.3.2.3.2 GET

This method shall support the URI query parameters specified in table 5.3.2.3.2-1.

Table 5.3.2.3.2-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description
ipv4Addr	Ipv4Addr	C	0..1	The IPv4 Address of the served UE. (NOTE 1) (NOTE 3) (NOTE 4)
ipv6Prefix	Ipv6Prefix	C	0..1	The IPv6 Address of the served UE. (NOTE 1) (NOTE 3) (NOTE 4) The NF service consumer shall append '/128' to the IPv6 address in the attribute value. E.g. '2001:db8:85a3::8a2e:370:7334/128'.
macAddr48	MacAddr48	C	0..1	The MAC Address of the served UE. (NOTE 1)
dnn	Dnn	O	0..1	DNN
supi	Supi	O	0..1	Subscription Permanent Identifier
gpsi	Gpsi	O	0..1	Generic Public Subscription Identifier
snssai	Snssai	O	0..1	The identification of slice. (NOTE 2)
ipDomain	string	O	0..1	The IPv4 address domain identifier. (NOTE 2)
supp-feat	SupportedFeatures	O	0..1	To filter irrelevant responses related to unsupported features. (NOTE 5)
NOTE 1: One and only one of query parameter ipv4Addr, ipv6Prefix or macAddr48 shall be present.				
NOTE 2: The query parameters snssai and/or ipDomain, if applicable (IPv4 address overlapping), shall be present with query parameter ipv4Addr.				
NOTE 3: 5G-RG and FN-RG replaces UE for wireline access support. See 3GPP TS 23.316 [19].				
NOTE 4: The ipv4Addr and ipv6Prefix query parameters may include the IP address of devices in networks behind the UE (see clause 5.6.14 of 3GPP TS 23.501 [2]).				
NOTE 5: This query parameter may be present when there are supported features that apply to the retrieval of the "Individual PCF for a PDU Session Binding" resource as defined in clause 4.2.4.2. Otherwise, it shall be omitted.				

This method shall support the request data structures specified in table 5.3.2.3.2-2 and the response data structures and response codes specified in table 5.3.2.3.2-3.

Table 5.3.2.3.2-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 5.3.2.3.2-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
PcfBinding	M	1	200 OK	The individual PCF for a PDU Session binding information resource matching the query parameter(s) is returned.
n/a			204 No Content	There is no PCF for a PDU Session binding information matching the query parameter(s).
ProblemDetails	O	0..1	400 Bad Request	More than one binding information is found. (NOTE 2)
NOTE 1: The mandatory HTTP error status codes for the GET method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [6] shall also apply.				
NOTE 2: Failure cases are described in clause 5.7.				

5.3.3 Resource: Individual PCF for a PDU Session Binding

5.3.3.1 Description

This resource represents an individual PCF for a PDU Session binding information of a given UE address(es) registered in the BSF.

5.3.3.2 Resource definition

Resource URI: {apiRoot}/nbsf-management/<apiVersion>/pcfBindings/{bindingId}

This resource shall support the resource URI variables defined in table 5.3.3.2-1.

Table 5.3.3.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 5.1
bindingId	string	Represents the individual PCF for a PDU Session Binding. To enable that the value is used as part of a URI, the string shall only contain characters allowed according to the "lower-with-hyphen" naming convention defined in 3GPP TS 29.501 [7].

5.3.3.3 Resource Standard Methods

5.3.3.3.1 DELETE

This method shall support the URI query parameters specified in table 5.3.3.3.1-1.

Table 5.3.3.3.1-1: URI query parameters supported by the DELETE method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in table 5.3.3.3.1-2 and the response data structures and response codes specified in table 5.3.3.3.1-3.

Table 5.3.3.3.1-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 5.3.3.3.1-3: Data structures supported by the DELETE Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	Successful case: The Individual PCF for a PDU Session binding information resource is deleted.
RedirectResponse	O	0..1	307 Temporary Redirect	Temporary redirection, during Individual PCF for a PDU Session Binding deletion. The response shall include a Location header field containing an alternative URI of the resource located in an alternative BSF (service) instance. Applicable if the feature "ES3XX" is supported.
RedirectResponse	O	0..1	308 Permanent Redirect	Permanent redirection, during Individual PCF for a PDU Session Binding deletion. The response shall include a Location header field containing an alternative URI of the resource located in an alternative BSF (service) instance. Applicable if the feature "ES3XX" is supported.

NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [6] shall also apply.

Table 5.3.3.3.1-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative BSF (service) instance.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target NF (service) instance towards which the request is redirected.

Table 5.3.3.3.1-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative BSF (service) instance.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target NF (service) instance towards which the request is redirected.

5.3.3.3.2 PATCH

This method shall support the URI query parameters specified in table 5.3.3.3.2-1.

Table 5.3.3.3.2-1: URI query parameters supported by the PATCH method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in table 5.3.3.3.2-2 and the response data structures and response codes specified in table 5.3.3.3.2-3.

Table 5.3.3.3.2-2: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
PcfBindingPatch	M	1	Update an individual PCF binding information.

Table 5.3.3.3.2-3: Data structures supported by the PATCH Response Body on this resource

Data type	P	Cardinality	Response codes	Description
PcfBinding	M	1	200 OK	Successful case: The Individual PCF for a PDU Session binding information resource is updated.
RedirectResponse	O	0..1	307 Temporary Redirect	Temporary redirection, during Individual PCF for a PDU Session Binding modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative BSF (service) instance. Applicable if the feature "ES3XX" is supported.
RedirectResponse	O	0..1	308 Permanent Redirect	Permanent redirection, during Individual PCF for a PDU Session Binding modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative BSF (service) instance. Applicable if the feature "ES3XX" is supported.

NOTE: The mandatory HTTP error status codes for the PATCH method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [6] shall also apply.

Table 5.3.3.3.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative BSF (service) instance.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target NF (service) instance towards which the request is redirected.

Table 5.3.3.3.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative BSF (service) instance.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target NF (service) instance towards which the request is redirected.

5.3.4 Resource: Binding Subscriptions

5.3.4.1 Description

The Binding Subscriptions resource represents the collection of subscriptions to events in the Nbsf_Management service.

5.3.4.2 Resource definition

Resource URI: {apiRoot}/nbsf-management/<apiVersion>/subscriptions

The <apiVersion> shall be set as described in clause 5.1.

This resource shall support the resource URI variables defined in table 5.3.4.2-1.

Table 5.3.4.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 5.1

5.3.4.3 Resource Standard Methods

5.3.4.3.1 POST

This method shall support the URI query parameters specified in table 5.3.4.3.1-1.

Table 5.3.4.3.1-1: URI query parameters supported by the POST method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in table 5.3.4.3.1-2 and the response data structures and response codes specified in table 5.3.4.3.1-3.

Table 5.3.4.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
BsfSubscription	M	1	Create a new Individual binding Subscription resource.

Table 5.3.4.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
BsfSubscriptionResp	M	1	201 Created	The creation of an Individual Binding Subscription resource is confirmed.
NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [6] also apply.				

Table 5.3.4.3.1-4: Headers supported by the 201 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains the URI of the newly created resource, according to the structure: {apiRoot}/nbsf-management/<apiVersion>/subscriptions/{subId}

5.3.4.4 Resource Custom Operations

None.

5.3.5 Resource: Individual Binding Subscription

5.3.5.1 Description

The Individual Binding Subscription resource represents a single subscription to the event notification in the service.

5.3.5.2 Resource definition

Resource URI: {apiRoot}/nbsf-management/<apiVersion>/subscriptions/{subId}

The <apiVersion> shall be set as described in clause 5.1.

This resource shall support the resource URI variables defined in table 5.3.5.2-1.

Table 5.3.5.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 5.1
subId	string	Identifies a subscription to event notification.

5.3.5.3 Resource Standard Methods

5.3.5.3.1 PUT

This method shall support the URI query parameters specified in table 5.3.5.3.1-1.

Table 5.3.5.3.1-1: URI query parameters supported by the PUT method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in table 5.3.5.3.1-2 and the response data structures and response codes specified in table 5.3.5.3.1-3.

Table 5.3.5.3.1-2: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
BsfSubscription	M	1	Modify the existing Individual Binding Subscription resource matching the subId according to the representation in the BsfSubscription.

Table 5.3.5.3.1-3: Data structures supported by the PUT Response Body on this resource

Data type	P	Cardinality	Response codes	Description
BsfSubscriptionResp	M	1	200 OK	Successful case: The Individual Binding Subscription resource matching the subId was modified and a representation is returned.
n/a			204 No Content	Successful case: The Individual Binding Subscription resource matching the subId was modified.
RedirectResponse	O	0..1	307 Temporary Redirect	Temporary redirection, during Individual Binding Subscription modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative BSF (service) instance.
RedirectResponse	O	0..1	308 Permanent Redirect	Permanent redirection, during Individual Binding Subscription modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative BSF (service) instance.
NOTE: The mandatory HTTP error status codes for the PUT method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [6] also apply.				

Table 5.3.5.3.1-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative BSF (service) instance.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target NF (service) instance towards which the request is redirected

Table 5.3.5.3.1-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative BSF (service) instance.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target NF (service) instance towards which the request is redirected

5.3.5.3.2 DELETE

This method shall support the URI query parameters specified in table 5.3.5.3.2-1.

Table 5.3.5.3.2-1: URI query parameters supported by the DELETE method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in table 5.3.5.3.2-2 and the response data structures and response codes specified in table 5.3.5.3.2-3.

Table 5.3.5.3.2-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 5.3.5.3.2-3: Data structures supported by the DELETE Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	Successful case: The Individual Binding Subscription resource matching the subId was deleted.
RedirectResponse	O	0..1	307 Temporary Redirect	Temporary redirection, during Individual Binding Subscription deletion. The response shall include a Location header field containing an alternative URI of the resource located in an alternative BSF (service) instance.
RedirectResponse	O	0..1	308 Permanent Redirect	Permanent redirection, during Individual Binding Subscription deletion. The response shall include a Location header field containing an alternative URI of the resource located in an alternative BSF (service) instance.
NOTE: The mandatory HTTP error status code for the DELETE method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [6] also apply.				

Table 5.3.5.3.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative BSF (service) instance.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target NF (service) instance towards which the request is redirected

Table 5.3.5.3.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative BSF (service) instance.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target NF (service) instance towards which the request is redirected

5.3.5.4 Resource Custom Operations

None.

5.3.6 Void

5.3.7 Resource: PCF for a UE Bindings

5.3.7.1 Description

This resource represents a collection of the different PCF for a UE binding information of given UE identifier (i.e., SUPI) registered in the BSF.

5.3.7.2 Resource definition

Resource URI: {apiRoot}/nbsf-management/<apiVersion>/pcf-ue-bindings

The <apiVersion> shall be set as described in clause 5.1.

This resource shall support the resource URI variables defined in table 5.3.7.2-1.

Table 5.3.7.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 5.1

5.3.7.3 Resource Standard Methods

5.3.7.3.1 POST

This method shall support the URI query parameters specified in table 5.3.7.3.1-1.

Table 5.3.7.3.1-1: URI query parameters supported by the POST method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in table 5.3.7.3.1-2 and the response data structures and response codes specified in table 5.3.7.3.1-3.

Table 5.3.7.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
PcfForUeBinding	M	1	Register a new Individual PCF for a UE Binding information.

Table 5.3.7.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
PcfForUeBinding	M	1	201 Created	The creation of an individual PCF for a UE Binding.
NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [6] shall also apply.				

Table 5.3.7.3.1-4: Headers supported by the 201 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains the URI of the newly created resource, according to the structure: {apiRoot}/nbsf-management/<apiVersion>/pcf-ue-bindings/{bindingId}

5.3.7.3.2 GET

This method shall support the URI query parameters specified in table 5.3.7.3.2-1.

Table 5.3.7.3.2-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description
supi	Supi	O	0..1	Subscription Permanent Identifier. (NOTE 1)
gpsi	Gpsi	O	0..1	Generic Public Subscription Identifier. (NOTE 1)
supp-feat	SupportedFeatures	O	0..1	To filter irrelevant responses related to unsupported features. (NOTE 2)
NOTE 1: At least one parameter shall be present.				
NOTE 2: This query parameter may be present when there are supported features that apply to the retrieval of the "Individual PCF for a UE Binding" resource as defined in clause 4.2.4.3. Otherwise, it shall be omitted.				

This method shall support the request data structures specified in table 5.3.7.3.2-2 and the response data structures and response codes specified in table 5.3.7.3.2-3.

Table 5.3.7.3.2-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 5.3.7.3.2-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
array(PcfForUeBinding)	M	0..N	200 OK	The individual PCF for a UE binding resource(s) matching the query parameter(s) are returned.
NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [6] shall also apply.				

5.3.8 Resource: Individual PCF for a UE Binding

5.3.8.1 Description

This resource represents an individual PCF for a UE binding information of given UE identifier (i.e SUPI) registered in the BSF.

5.3.8.2 Resource definition

Resource URI: {apiRoot}/nbsf-management/<apiVersion>/pcf-ue-bindings/{bindingId}

The <apiVersion> shall be set as described in clause 5.1.

This resource shall support the resource URI variables defined in table 5.3.8.2-1.

Table 5.3.8.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 5.1
bindingId	string	Represents the individual PCF for a UE Binding. To enable that the value is used as part of a URI, the string shall only contain characters allowed according to the "lower-with-hyphen" naming convention defined in 3GPP TS 29.501 [7].

5.3.8.3 Resource Standard Methods

5.3.8.3.1 DELETE

This method shall support the URI query parameters specified in table 5.3.8.3.1-1.

Table 5.3.8.3.1-1: URI query parameters supported by the DELETE method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in table 5.3.8.3.1-2 and the response data structures and response codes specified in table 5.3.8.3.1-3.

Table 5.3.8.3.1-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 5.3.8.3.1-3: Data structures supported by the DELETE Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	Successful case: The Individual PCF for a UE Binding information resource is deleted.
RedirectResponse	O	0..1	307 Temporary Redirect	Temporary redirection, during Individual PCF for a UE Binding deletion. The response shall include a Location header field containing an alternative URI of the resource located in an alternative BSF (service) instance.
RedirectResponse	O	0..1	308 Permanent Redirect	Permanent redirection, during Individual PCF for a UE Binding deletion. The response shall include a Location header field containing an alternative URI of the resource located in an alternative BSF (service) instance.
NOTE: The mandatory HTTP error status codes for the DELETE method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [6] shall also apply.				

Table 5.3.8.3.1-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative BSF (service) instance.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target NF (service) instance towards which the request is redirected.

Table 5.3.8.3.1-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative BSF (service) instance.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target NF (service) instance towards which the request is redirected.

5.3.8.3.2 PATCH

This method shall support the URI query parameters specified in table 5.3.8.3.2-1.

Table 5.3.8.3.2-1: URI query parameters supported by the PATCH method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in table 5.3.8.3.2-2 and the response data structures and response codes specified in table 5.3.8.3.2-3.

Table 5.3.8.3.2-2: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
PcfForUeBindingPatch	M	1	Update an individual PCF for a UE binding information.

Table 5.3.8.3.2-3: Data structures supported by the PATCH Response Body on this resource

Data type	P	Cardinality	Response codes	Description
PcfForUeBinding	M	1	200 OK	Successful case: The Individual PCF for a UE binding information resource is updated.
RedirectResponse	O	0..1	307 Temporary Redirect	Temporary redirection, during Individual PCF for a UE Binding modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative BSF (service) instance.
RedirectResponse	O	0..1	308 Permanent Redirect	Permanent redirection, during Individual PCF for a UE Binding modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative BSF (service) instance.

NOTE: The mandatory HTTP error status codes for the PATCH method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [6] shall also apply.

Table 5.3.8.3.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative BSF (service) instance.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target NF (service) instance towards which the request is redirected.

Table 5.3.8.3.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative BSF (service) instance.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target NF (service) instance towards which the request is redirected.

5.3.9 Resource: PCF for an MBS Session Bindings

5.3.9.1 Description

This resource represents the collection of PCF for an MBS Session Bindings registered at the BSF.

5.3.9.2 Resource definition

Resource URI: {apiRoot}/nbsf-management/v1/pcf-mbs-bindings

This resource shall support the resource URI variables defined in table 5.3.9.2-1.

Table 5.3.9.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See subclause 5.1.

5.3.9.3 Resource Standard Methods

5.3.9.3.1 POST

This method shall support the URI query parameters specified in table 5.3.9.3.1-1.

Table 5.3.9.3.1-1: URI query parameters supported by the POST method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in table 5.3.9.3.1-2 and the response data structures and response codes specified in table 5.3.9.3.1-3.

Table 5.3.9.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
PcfMbsBinding	M	1	Contains the parameters to request to register a new PCF for an MBS Session Binding.

Table 5.3.9.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
PcfMbsBinding	M	1	201 Created	Successful case. A new "Individual PCF for an MBS Session Binding" resource is created and the corresponding URI is returned in an HTTP Location header.
MbsExtProblemDetails	O	0..1	403 Forbidden	The existing PCF binding information stored in the BSF for the MBS session is returned. (NOTE 2)
NOTE: The mandatory HTTP error status codes for the HTTP POST method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [6] shall also apply.				
NOTE 2: Failure cases are described in clause 5.7.				

Table 5.3.9.3.1-4: Headers supported by the 201 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains the URI of the newly created resource, according to the structure: {apiRoot}/nbsf-management/v1/pcf-mbs-bindings/{bindingId}

5.3.9.3.2 GET

This method shall support the URI query parameters specified in table 5.3.9.3.2-1.

Table 5.3.9.3.2-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description
mbs-session-id	MbsSessionId	M	1	Contains the identifier of the MBS Session to which the requested MBS Session binding is related.
supp-feat	SupportedFeatures	O	0..1	Contains the list of features supported by the NF service consumer and used to filter irrelevant responses related to unsupported features.

This method shall support the request data structures specified in table 5.3.9.3.2-2 and the response data structures and response codes specified in table 5.3.9.3.2-3.

Table 5.3.9.3.2-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 5.3.9.3.2-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
array(PcfMbsBinding) (NOTE 2)	M	0..N	200 OK	Successful case. The "Individual PCF for an MBS Session Binding" resource matching the provided query parameter(s) is returned.
ProblemDetails	O	0..1	400 Bad Request	More than one binding information matching the provided query parameter(s) is found. (NOTE 3)
NOTE 1: The mandatory HTTP error status codes for the HTTP GET method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [6] shall also apply.				
NOTE 2: In this release of the specification, only a single element shall be provided within the array.				
NOTE 3: Failure cases are described in clause 5.7.				

5.3.9.4 Resource Custom Operations

None.

5.3.10 Resource: Individual PCF for an MBS Session Binding

5.3.10.1 Description

This resource represents an "Individual PCF for an MBS Session Binding" registered at the BSF.

5.3.10.2 Resource definition

Resource URI: **{apiRoot}/nbsf-management/v1/pcf-mbs-bindings/{bindingId}**

This resource shall support the resource URI variables defined in table 5.3.10.2-1.

Table 5.3.10.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See subclause 5.1
bindingId	string	Represents the identifier of the "Individual PCF for an MBS Session Binding" resource. To enable that the value is used as part of a URI, the string shall only contain characters allowed according to the "lower-with-hyphen" naming convention defined in 3GPP TS 29.501 [7].

5.3.10.3 Resource Standard Methods

5.3.10.3.1 PATCH

This method shall support the URI query parameters specified in table 5.3.10.3.1-1.

Table 5.3.10.3.1-1: URI query parameters supported by the PATCH method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in table 5.3.10.3.1-2 and the response data structures and response codes specified in table 5.3.10.3.1-3.

Table 5.3.10.3.1-2: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
PcfMbsBindingPatch	M	1	Contains the requested modifications to the PCF for an MBS Session Binding.

Table 5.3.10.3.1-3: Data structures supported by the PATCH Response Body on this resource

Data type	P	Cardinality	Response codes	Description
PcfMbsBinding	M	1	200 OK	Successful case: The "Individual PCF for an MBS Session Binding" resource is successfully modified and a representation of the updated resource is returned in the response body.
n/a			204 No Content	Successful case: The "Individual PCF for an MBS Session Binding" resource is successfully modified and no content is returned in the response body.
RedirectResponse	O	0..1	307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative BSF (service) instance.
RedirectResponse	O	0..1	308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative BSF (service) instance.

NOTE: The mandatory HTTP error status codes for the HTTP PATCH method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [6] shall also apply.

Table 5.3.10.3.1-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative BSF (service) instance.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target NF (service) instance towards which the request is redirected.

Table 5.3.10.3.1-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative BSF (service) instance.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target NF (service) instance towards which the request is redirected.

5.3.10.3.2 DELETE

This method shall support the URI query parameters specified in table 5.3.10.3.2-1.

Table 5.3.10.3.2-1: URI query parameters supported by the DELETE method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in table 5.3.10.3.2-2 and the response data structures and response codes specified in table 5.3.10.3.2-3.

Table 5.3.10.3.2-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 5.3.10.3.2-3: Data structures supported by the DELETE Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	Successful case: The "Individual PCF for an MBS Session Binding" resource is successfully deleted.
RedirectResponse	O	0..1	307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative BSF (service) instance.
RedirectResponse	O	0..1	308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative BSF (service) instance.
NOTE: The mandatory HTTP error status codes for the HTTP DELETE method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [6] shall also apply.				

Table 5.3.10.3.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative BSF (service) instance.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target NF (service) instance towards which the request is redirected.

Table 5.3.10.3.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative BSF (service) instance.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target NF (service) instance towards which the request is redirected.

5.3.10.4 Resource Custom Operations

None.

5.4 Custom Operations without associated resources

None in this release of this specification.

5.5 Notifications

5.5.1 General

Notifications shall comply to clause 6.2 of 3GPP TS 29.500 [6] and clause 4.6.2.3 of 3GPP TS 29.501 [7].

Table 5.5.1-1: Notifications overview

Notification	Callback URI	HTTP method or custom operation	Description (service operation)
BSF Notification	{notifUri}	POST	Provides information about observed BSF events.

5.5.2 BSF Notification

5.5.2.1 Description

The BSF Notification is used by the BSF to report one or several observed events to an NF service consumer that has subscribed to such Notifications via the Individual Binding Subscription Resource.

5.5.2.2 Target URI

The Callback URI "{notifUri}" shall be used with the callback URI variables defined in table 5.5.2.2-1.

Table 5.5.2.2-1: Callback URI variables

Name	Data type	Definition
notifUri	Uri	The Notification Uri as assigned within the Individual Binding Subscription Resource and described within the BsfSubscription type (see table 5.6.2.7-1).

5.5.2.3 Standard Methods

5.5.2.3.1 POST

This method shall support the URI query parameters specified in table 5.5.2.3.1-1.

Table 5.5.2.3.1-1: URI query parameters supported by the POST method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in table 5.5.2.3.1-2 and the response data structures and response codes specified in table 5.5.2.3.1-3.

Table 5.5.2.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
BsfNotification	M	1	Provides Information about observed events

Table 5.5.2.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	The receipt of the Notification is acknowledged.
RedirectResponse	O	0..1	307 temporary redirect	Temporary redirection, during the event notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative NF consumer (service) instance where the notification should be sent.
RedirectResponse	O	0..1	308 Permanent Redirect	Permanent redirection, during the event notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative NF consumer (service) instance where the notification should be sent.
ProblemDetails	O	0..1	404 Not Found	The NF service consumer can use this response when the notification cannot be sent to another host.
NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [6] also apply.				

Table 5.5.2.3.1-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI representing the end point of an alternative NF consumer (service) instance towards which the notification should be redirected.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target NF (service) instance towards which the notification request is redirected

Table 5.5.2.3.1-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI representing the end point of an alternative NF consumer (service) instance towards which the notification should be redirected.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target NF (service) instance towards which the notification request is redirected

5.6 Data Model

5.6.1 General

This clause specifies the application data model supported by the API.

Table 5.6.1-1 specifies the data types defined for the Nbsf_Management service based interface protocol.

Table 5.6.1-1: Nbsf_Management specific Data Types

Data type	Section defined	Description	Applicability
BindingLevel	5.6.3.3	Contains the binding level.	
BindingResp	5.6.2.6	Contains the binding information.	SamePcf
BsfEvent	5.6.3.5	Contains the event notified by the BSF.	
BsfEventNotification	5.6.2.9	Contains an event notification.	
BsfNotification	5.6.2.8	Contains the notification to the events.	
BsfSubscription	5.6.2.7	Contains the event subscription data.	
BsfSubscriptionResp	5.6.4.1	Contains the response to the subscription request. It consists of the resource representation within BsfSubscription data type and, if available, the matched observed event within the BsfNotification data type.	
ExtProblemDetails	5.6.2.5	Contains the FQDN or IP endpoints of the existing PCF and cause value if there is an existing PCF binding information for the indicated combination.	SamePcf
ParameterCombination	5.6.2.4	The combination used by the BSF to check whether there is an existing PCF binding information.	SamePcf
PcfBinding	5.6.2.2	Identifies an Individual PCF for a PDU session binding.	
PcfBindingPatch	5.6.2.3	Identifies an Individual PCF for a PDU session binding used for Patch method.	BindingUpdate
PcfMbsBinding	5.6.2.15	Represents an Individual PCF for an MBS Session binding.	
PcfMbsBindingPatch	5.6.2.16	Represents the requested modifications to an Individual PCF for an MBS Session binding.	
PcfForPduSessionInfo	5.6.2.13	The information of the PCF for a PDU session.	
PcfForUeBinding	5.6.2.10	Identifies an Individual PCF for a UE binding.	
PcfForUeBindingPatch	5.6.2.11	Identifies the updates to an Individual PCF for a UE binding.	
PcfForUeInfo	5.6.2.14	The information of the PCF for a UE.	
SnsaiDnnPair	5.6.2.12	Represents a S-NSSAI and DNN pair.	

Table 5.6.1-2 specifies data types re-used by the Nbsf_Management service based interface protocol from other specifications, including a reference to their respective specifications and when needed, a short description of their use within the Nbsf_Management service based interface.

Table 5.6.1-2: Nbsf_Management re-used Data Types

Data type	Reference	Comments	Applicability
DateTime	3GPP TS 29.571 [10]		
DiameterIdentity	3GPP TS 29.571 [10]		
Dnn	3GPP TS 29.571 [10]		
Fqdn	3GPP TS 29.571 [10]		
Gpsi	3GPP TS 29.571 [10]		
IpEndPoint	3GPP TS 29.510 [12]		
Ipv4Addr	3GPP TS 29.571 [10]		
Ipv4AddrMask	3GPP TS 29.571 [10]	String identifying an IPv4 address mask.	
Ipv4AddrRm	3GPP TS 29.571 [10]		
Ipv6Prefix	3GPP TS 29.571 [10]		
Ipv6PrefixRm	3GPP TS 29.571 [10]		
MacAddr48	3GPP TS 29.571 [10]		
MacAddr48Rm	3GPP TS 29.571 [10]		
MbsSessionId	3GPP TS 29.571 [10]	Represents the identifier of an MBS Session.	
NfInstanceId	3GPP TS 29.571 [10]		
NfSetId	3GPP TS 29.571 [10]		
ProblemDetails	3GPP TS 29.571 [10]	Used in error responses to provide more detailed information about an error.	
RedirectResponse	3GPP TS 29.571 [10]	Contains redirection related information.	ES3XX
Snsai	3GPP TS 29.571 [10]		
Supi	3GPP TS 29.571 [10]		
SupportedFeatures	3GPP TS 29.571 [10]	Used to negotiate the applicability of the optional features defined in table 5.8-1.	

5.6.2 Structured data types

5.6.2.1 Introduction

This clause defines the structures to be used in resource representations.

5.6.2.2 Type PcfBinding

Table 5.6.2.2-1: Definition of type PcfBinding

Attribute name	Data type	P	Cardinality	Description	Applicability
supi	Supi	O	0..1	Subscription Permanent Identifier	
gpsi	Gpsi	O	0..1	Generic Public Subscription Identifier	
ipv4Addr	Ipv4Addr	C	0..1	The IPv4 Address of the served UE. (NOTE 4) (NOTE 8)	
ipv6Prefix	Ipv6Prefix	C	0..1	The IPv6 Address Prefix of the served UE. (NOTE 4) (NOTE 5) (NOTE 8)	
addIpv6Prefixes	array(Ipv6Prefix)	O	1..N	The additional IPv6 Address Prefixes of the served UE. (NOTE 4) (NOTE 5) (NOTE 8) (NOTE 10)	MultiUeAddr
ipDomain	string	O	0..1	IPv4 address domain identifier. (NOTE 1) (NOTE 8)	
macAddr48	MacAddr48	C	0..1	The MAC Address of the served UE. (NOTE 8)	
addMacAddrs	array(MacAddr48)	O	1..N	The additional MAC Addresses of the served UE. (NOTE 8) (NOTE 10)	MultiUeAddr
dnn	Dnn	M	1	DNN, a full DNN with both the Network Identifier and Operator Identifier, or a DNN with the Network Identifier only.	
pcfFqdn	Fqdn	C	0..1	FQDN of the PCF hosting the Npcf_PolicyAuthorization service. (NOTE 2) (NOTE 9)	
pcfIpEndPoints	array(IpEndPoint)	C	1..N	IP end points of the PCF hosting the Npcf_PolicyAuthorization service. (NOTE 2) (NOTE 9)	
pcfDiamHost	DiameterIdentity	C	0..1	The diameter host for an individual PCF. (NOTE 3) (NOTE 9)	
pcfDiamRealm	DiameterIdentity	C	0..1	The diameter realm for an individual PCF. (NOTE 3) (NOTE 9)	
pcfSmFqdn	Fqdn	O	0..1	FQDN of the PCF hosting the Npcf_SMPolicyControl service. (NOTE 7) (NOTE 10)	SamePcf
pcfSmIpEndPoints	array(IpEndPoint)	O	1..N	IP end points of the PCF hosting the Npcf_SMPolicyControl service. (NOTE 7) (NOTE 10)	SamePcf
snssai	Snssai	M	1	The identification of slice.	
suppFeat	SupportedFeatures	C	0..1	Used to negotiate the supported optional features as described in clause 5.8. Shall be present in the HTTP POST request/response; or in the HTTP GET response if the "supp-feat" attribute query parameter is included in the HTTP GET request.	
pcfId	NfInstanceId	O	0..1	PCF instance identifier	
pcfSetId	NfSetId	O	0..1	The PCF set Id	
recoveryTime	DateTime	O	0..1	Recovery time of the PCF	
paraCom	ParameterCombination	O	0..1	If it is included, the BSF shall check whether there is an existing PCF binding information for the indicated combination. (NOTE 6) (NOTE 10)	SamePcf
bindLevel	BindingLevel	O	0..1	Contains the level of binding.	
ipv4FrameRouteList	array(Ipv4AddrMask)	O	1..N	List of Framed Route information of IPv4.	
ipv6FrameRouteList	array(Ipv6Prefix)	O	1..N	List of Framed Route information of IPv6.	

NOTE 1: The ipDomain attribute may only be provided if the ipv4Addr attribute is present.

NOTE 2: When the "ExtendedSamePcf" feature is not supported, at least one of "pcfFqdn" or "pcfIpEndPoints" shall be included if the PCF supports the Npcf_PolicyAuthorization service. When the "ExtendedSamePcf" feature is supported these attributes may be provided if available.

NOTE 3: When the "ExtendedSamePcf" feature is not supported, both pcfDiamHost and pcfDiamRealm are provided if the PCF supports Rx interface. When the "ExtendedSamePcf" feature is supported these attributes may be provided if available.

NOTE 4: 5G-RG and FN-RG replaces UE for wireline access support. See 3GPP TS 23.316 [19].

NOTE 5: IPv6 prefix(es) shorter than /64 or full IPv6 address(es) with a /128 prefix may be encoded as the "ipv6Prefix" and "addIpv6Prefixes" attributes, according to 3GPP TS 23.316 [19], clause 8.3.1.

NOTE 6: If the BSF finds that there is an existing Individual PCF for a PDU Session Binding resource for the indicated combination containing Npcf_SMPolicyControl service addressing information, the BSF shall not check other Individual PCF for a PDU Session Binding resources and shall reject the ongoing registration, and return the FQDN or IP endpoints of the Npcf_SMPolicyControl service of the matching Individual PCF for a PDU Session Binding resource to the requesting PCF.

NOTE 7: At least one of the "pcfSmFqdn" attribute or the "pcfSmlpEndPoints" attribute shall be included in the binding information, if the binding refers to an SM Policy association and if the "SamePcf" feature is supported and the PCF determines that the same PCF shall be selected for the SM Policy associations with the same SUPI/DNN/S-NSSAI parameter combination in the non-roaming or home-routed scenario based on operator's policies and configuration.

NOTE 8: When the "ExtendedSamePcf" feature is not supported the address information of the served UE shall be provided, i.e., either the "ipv4Addr", the "ipv6Prefix" and/or "addIpv6Prefixes" attributes or the "macAddr48" and/or "addMacAddrs" attributes shall be provided as specified in clause 4.2.2.2.

NOTE 9: When the "ExtendedSamePcf" feature is not supported the address information of the Npcf_PolicyAuthorization service and/or Rx interface shall be provided, i.e., both "pcfDiamHost" and "pcfDiamRealm" and/or at least one of the "pcfFqdn" or "pcfEndPoints" shall be provided as specified in clause 4.2.2.2.

NOTE 10: This attribute does not apply when the NF service consumer is an AF/NEF.

5.6.2.3 Type PcfBindingPatch

Table 5.6.2.3-1: Definition of type PcfBindingPatch

Attribute name	Data type	P	Cardinality	Description	Applicability
ipv4Addr	Ipv4AddrRm	O	0..1	The IPv4 Address of the served UE. (NOTE 2)	
ipDomain	string	O	0..1	IPv4 address domain identifier. (NOTE 1)	
ipv6Prefix	Ipv6PrefixRm	O	0..1	The IPv6 Address Prefix of the served UE. (NOTE 2) (NOTE 3)	
addIpv6Prefixes	array(Ipv6Prefix)	O	1..N	The additional IPv6 Address Prefixes of the served UE. (NOTE 2) (NOTE 3)	MultiUeAddr
macAddr48	MacAddr48Rm	O	0..1	The MAC Address of the served UE.	
addMacAddrs	array(MacAddr48)	O	1..N	The additional MAC Addresses of the served UE.	MultiUeAddr
pcfId	NfInstanceId	O	0..1	PCF instance identifier	
pcfFqdn	Fqdn	O	0..1	FQDN of the PCF hosting the Npcf_PolicyAuthorization service.	
pcfIpEndPoints	array(IpEndPoint)	O	1..N	IP end points of the PCF hosting the Npcf_PolicyAuthorization service.	
pcfDiamHost	DiameterIdentity	O	0..1	The diameter host for an individual PCF.	
pcfDiamRealm	DiameterIdentity	O	0..1	The diameter realm for an individual PCF.	
NOTE 1: If applicable, the consumer (e.g. PCF) shall also request to remove the ipDomain attribute if the ipv4Addr attribute is requested to be removed.					
NOTE 2: 5G-RG and FN-RG replaces UE for wireline access support. See 3GPP TS 23.316 [19].					
NOTE 3: IPv6 prefix(es) shorter than /64 or full IPv6 address(es) with a /128 prefix can be encoded as the "ipv6Prefix" and "addIpv6Prefixes" attributes, according to 3GPP TS 23.316 [19], clause 8.3.1.					

5.6.2.4 Type ParameterCombination

Table 5.6.2.4-1: Definition of type ParameterCombination

Attribute name	Data type	P	Cardinality	Description	Applicability
supi	Supi	O	0..1	Subscription Permanent Identifier	
dnn	Dnn	O	0..1	DNN, a full DNN with both the Network Identifier and Operator Identifier, or a DNN with the Network Identifier only.	
snssai	Snssai	O	0..1	The identification of slice.	
NOTE 1: At least one of the attributes in this table shall be included.					
NOTE 2: The applicable parameter combinations in a given deployment shall be disjoint combinations. E.g., if a deployment requires a parameter combination that includes a SUPI value for a DNN/S-NSSAI combination, subsequent parameter combinations of that DNN/S-NSSAI combination shall also include the corresponding SUPI attribute.					

5.6.2.5 Type ExtProblemDetails

Table 5.6.2.5-1: Definition of type ExtProblemDetails as a list of to be combined data types

Data Type	P	Cardinality	Description	Applicability
ProblemDetails	O	0..1	Problem Details	
BindingResp	O	0..1	PCF Binding Information	

5.6.2.6 Type BindingResp

Table 5.6.2.6-1: Definition of type BindingResp

Attribute name	Data type	P	Cardinality	Description	Applicability
pcfSmFqdn	Fqdn	O	0..1	FQDN of the PCF hosting the Npcf_SMPolicyControl service. (NOTE)	
pcfSmlpEndPoint s	array(IpEndPoint)	O	1..N	IP end points of the PCF hosting the Npcf_SMPolicyControl service. (NOTE)	
NOTE: Either the "pcfSmFqdn" attribute or the "pcfSmlpEndPoints" attribute shall be included.					

5.6.2.7 Type BsfSubscription

Table 5.6.2.7-1: Definition of type BsfSubscription

Attribute name	Data type	P	Cardinality	Description	Applicability
events	array(BsfEvent)	M	1..N	Subscribed Events.	
notifUri	Uri	M	1	Notification URI.	
notifCorreId	string	M	1	It is used to set the value of Notification Correlation ID in the corresponding notification.	
supi	Supi	M	1	Subscription Permanent Identifier.	
gpsi	Gpsi	O	0..1	Identifies a GPSI.	
snssaiDnnPairs	SnssaiDnnPair	C	0..1	Represents the S-NSSAI and DNN pair for which the binding event report(s) shall apply. (NOTE)	
addSnssaiDnnPairs	array(SnssaiDnnPair)	C	1..N	Represents the additional S-NSSAI and DNN pairs for which the binding event report(s) shall apply. (NOTE)	AddSnssaiDnnPair
suppFeat	SupportedFeatures	C	0..1	List of Supported features used as described in clause 5.8. This parameter shall be supplied by NF service consumer and BSF in the POST request that request the creation of an Individual Binding Subscription resource and the related reply, respectively.	
NOTE: If the NF service consumer needs to subscribe to notifications for more than one S-NSSAI and DNN pairs and the "AddSnssaiDnnPair" feature is supported, the NF service consumer shall include one S-NSSAI and DNN pair in the "snssaiDnnPairs" attribute and the remaining S-NSSAI and DNN pairs in the "addSnssaiDnnPairs" attribute.					

5.6.2.8 Type BsfNotification

Table 5.6.2.8-1: Definition of type BsfNotification

Attribute name	Data type	P	Cardinality	Description	Applicability
notifCorreId	string	M	1	Notification correlation ID used to identify the subscription to which the notification relates. It shall be set to the same value as the "notifCorreId" attribute of BsfSubscription data type.	
eventNotifs	array(BsfEventNotification)	M	1..N	Notifications about Individual Events.	

5.6.2.9 Type BsfEventNotification

Table 5.6.2.9-1: Definition of type BsfEventNotification

Attribute name	Data type	P	Cardinality	Description	Applicability
event	BsfEvent	M	1	Event that is notified.	
pcfForUeInfo	PcfForUeInfo	C	0..1	The binding information of the PCF for a UE. It shall be included if the BSF is subscribed to the notification of "PCF_UE_BINDING_REGISTRATION" and "PCF_UE_BINDING_DEREGISTRATION" event and the registration or deregistration of PCF for a UE is detected.	
pcfForPduSessions	array(PcfForPduSessionInfo)	C	1..N	The binding information of the PCF for a PDU session. It shall be included if the BSF is subscribed to the notification of PCF_PDU_SESSION_BINDING_REGISTRATION event and the registration of the PCF for the PDU session is detected, and the BSF is subscribed to the notification of PCF_PDU_SESSION_BINDING_DEREGISTRATION and the deregistration of the PCF for the PDU session is detected.	
matchSnssaiDnn	array(SnssaiDnnPairs)	C	1..N	Matching S-NSSAI and DNN pairs. It shall be included if the BSF is subscribed to the notification of SNSSAI_DNN_BINDING_REGISTRATION and a PCF registration for the first PDU session for the DNN and SNSSAI combination is detected, and the BSF is subscribed to the notification of SNSSAI_DNN_BINDING_DEREGISTRATION and a PCF deregistration for the last PDU session for the DNN and SNSSAI combination is detected.	

5.6.2.10 Type PcfForUeBinding

Table 5.6.2.10-1: Definition of type PcfForUeBinding

Attribute name	Data type	P	Cardinality	Description	Applicability
supi	Supi	M	1	Subscription Permanent Identifier	
gpsi	Gpsi	O	0..1	Generic Public Subscription Identifier	
pcfForUeFqdn	Fqdn	C	0..1	FQDN of the PCF hosting the Npcf_AMPolicyAuthorization service, if available. (NOTE)	
pcfForUeIpEndpoints	array(IpEndPoint)	C	1..N	IP end points of the PCF hosting the Npcf_AMPolicyAuthorization service, if available. (NOTE)	
pcfId	NfInstanceId	O	0..1	PCF instance identifier	
pcfSetId	NfSetId	O	0..1	The PCF set Id	
bindLevel	BindingLevel	O	0..1	Contains the level of binding.	

suppFeat	SupportedFeatures	C	0..1	Used to negotiate the supported optional features as described in clause 5.8. Shall be present in the HTTP POST request/response or in the HTTP GET response if the "supp-feat" query parameter is included in the HTTP GET request.	
NOTE: At least one of the "pcfForUeFqdn" attribute or "pcfForUelpEndPoints" attribute shall be provided.					

5.6.2.11 Type PcfForUeBindingPatch

Table 5.6.2.11-1: Definition of type PcfForUeBindingPatch

Attribute name	Data type	P	Cardinality	Description	Applicability
pcfForUeFqdn	Fqdn	O	0..1	FQDN of the PCF hosting the Npcf_AMPolicyAuthorization service, if available.	
pcfForUelpEndPoints	array(IpEndPoint)	O	1..N	IP end points of the PCF hosting the Npcf_AMPolicyAuthorization service, if available.	
pcfId	NfInstanceId	O	0..1	PCF instance identifier	

5.6.2.12 Type SnsaiDnnPair

Table 5.6.2.12-1: Definition of type SnsaiDnnPair

Attribute name	Data type	P	Cardinality	Description	Applicability
snsai	Snsai	M	1	S-NSSAI	
dnn	Dnn	M	1	DNN	

5.6.2.13 Type PcfForUeInfo

Table 5.6.2.13-1: Definition of type PcfForUeInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
pcfId	NfInstanceId	O	0..1	PCF instance identifier.	
pcfSetId	NfSetId	O	0..1	The PCF set ID.	
bindLevel	BindingLevel	O	0..1	Contains the level of binding.	
pcfFqdn	Fqdn	O	0..1	FQDN of the PCF hosting the Npcf_AMPolicyAuthorization service.	
pcfIpEndPoints	array(IpEndPoint)	O	1..N	IP end points of the PCF hosting the Npcf_AMPolicyAuthorization service.	
NOTE: Either the "pcfFqdn" attribute or the "pcfIpEndPoints" attribute shall be included.					

5.6.2.14 Type PcfForPduSessionInfo

Table 5.6.2.14-1: Definition of type PcfForPduSessionInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
snssai	Snssai	M	1	S-NSSAI	
dnn	Dnn	M	1	DNN	
pcfId	NfInstanceId	O	0..1	PCF instance identifier.	
pcfSetId	NfSetId	O	0..1	The PCF set ID.	
bindLevel	BindingLevel	O	0..1	Contains the level of binding.	
ipv4Addr	Ipv4Addr	O	0..1	The IPv4 Address of the served UE.	
ipDomain	string	O	0..1	IPv4 address domain identifier. (NOTE x)	
ipv6Prefixes	array(Ipv6Prefix)	O	1..N	The IPv6 Address Prefixes of the served UE.	
macAddrs	array(MacAddr48)	O	1..N	The MAC Addresses of the served UE.	
pcfFqdn	Fqdn	O	0..1	FQDN of the PCF hosting the Npcf_PolicyAuthorization service.	
pcfIpEndPoints	array(IpEndPoint)	O	1..N	IP end points of the PCF hosting the Npcf_PolicyAuthorization service.	
NOTE 1: Either the "pcfFqdn" attribute or the "pcfIpEndPoints" attribute shall be included.					
NOTE 2: The "ipDomain" attribute may only be provided if the "ipv4Addr" attribute is present.					

5.6.2.15 Type PcfMbsBinding

Table 5.6.2.15-1: Definition of type PcfMbsBinding

Attribute name	Data type	P	Cardinality	Description	Applicability
mbsSessionId	MbsSessionId	M	1	Contains the identifier of the MBS Session to which the MBS Session binding is related.	
pcfFqdn	Fqdn	C	0..1	Contains the FQDN of the PCF handling the MBS Session. This attribute shall be provided, if available. (NOTE)	
pcfIpEndPoints	array(IpEndPoint)	C	1..N	Contains the IP end points of the PCF handling the MBS Session. This attribute shall be provided, if available. (NOTE)	
pcfId	NfInstanceId	O	0..1	Contains the identifier of the PCF instance handling the concerned MBS Session.	
pcfSetId	NfSetId	O	0..1	Contains the identifier of the PCF set to which the PCF instance handling the MBS Session belongs.	
bindLevel	BindingLevel	O	0..1	Contains the level of binding of the PCF handling the MBS Session.	
recoveryTime	DateTime	O	0..1	Contains the recovery timestamp of the NF service consumer (e.g. PCF handling the MBS Session). This attribute may be present only in the HTTP POST request.	
suppFeat	SupportedFeatures	C	0..1	Contains the supported features and is used to negotiate the supported optional features as described in clause 5.8. This attribute may be present in the HTTP POST request. It shall be present in the HTTP POST response, if it is included in the corresponding HTTP POST request, or in the HTTP GET response, if the "supp-feat" query parameter is included in the corresponding HTTP GET request.	
NOTE: At least one of the "pcfFqdn" attribute or the "pcfIpEndPoints" attribute shall be present.					

5.6.2.16 Type PcfMbsBindingPatch

Table 5.6.2.16-1: Definition of type PcfMbsBindingPatch

Attribute name	Data type	P	Cardinality	Description	Applicability
pcfFqdn	Fqdn	O	0..1	Contains the updated FQDN of the PCF handling the MBS Session.	
pcfIpEndPoints	array(IpEndPoint)	O	1..N	Contains the updated IP end points of the PCF handling the MBS Session.	
pcfId	NfnInstanceId	O	0..1	Contains the updated identifier of the PCF instance handling the concerned MBS Session.	

5.6.2.17 Type MbsExtProblemDetails

Table 5.6.2.17-1: Definition of type MbsExtProblemDetails as a list of to be combined data types

Data Type	P	Cardinality	Description	Applicability
ProblemDetails	O	0..1	Problem Details	
MbsBindingResp	O	0..1	PCF Binding Information for the MBS Session.	

5.6.2.18 Type MbsBindingResp

Table 5.6.2.18-1: Definition of type MbsBindingResp

Attribute name	Data type	P	Cardinality	Description	Applicability
pcfFqdn	Fqdn	O	0..1	FQDN of the PCF handling the MBS Session. (NOTE)	
pcfIpEndPoints	array(IpEndPoint)	O	1..N	IP end points of the PCF handling the MBS Session. (NOTE)	
NOTE: At least one of the "pcfFqdn" attribute or the "pcfIpEndPoints" attribute shall be present.					

5.6.3 Simple data types and enumerations

5.6.3.1 Introduction

This clause defines simple data types and enumerations that can be referenced from data structures defined in the previous clauses.

5.6.3.2 Simple data types

The simple data types defined in table 5.6.3.2-1 shall be supported.

Table 5.6.3.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

5.6.3.3 Enumeration: BindingLevel

Table 5.6.3.3-1: Enumeration BindingLevel

Enumeration value	Description	Applicability
NF_SET	Indicates the NF set level of binding.	
NF_INSTANCE	Indicates the NF instance level of binding.	

5.6.3.4 Void

5.6.3.5 Enumeration: BsfEvent

Table 5.6.3.5-1: Enumeration BsfEvent

Enumeration value	Description	Applicability
PCF_PDU_SESSION_BINDING_REGISTRATION	Indicates the binding of a PCF for a PDU session is registered.	
PCF_PDU_SESSION_BINDING_DEREGISTRATION	Indicates the binding of a PCF for a PDU session is deregistered.	
PCF_UE_BINDING_REGISTRATION	Indicates the binding of a PCF for a UE is registered.	
PCF_UE_BINDING_DEREGISTRATION	Indicates the binding of a PCF for a UE is deregistered.	
SNSSAI_DNN_BINDING_REGISTRATION	Indicates the binding of a PCF for a PDU session corresponding to the first PDU session for a DNN and S-NSSAI combination is registered.	
SNSSAI_DNN_BINDING_DEREGISTRATION	Indicates the binding of a PCF for a PDU session corresponding to the last PDU session for a DNN and S-NSSAI combination is deregistered.	

5.6.4 Data types describing alternative data types or combinations of data types

5.6.4.1 Type: BsfSubscriptionResp

Table 5.6.4.1-1: Definition of type BsfSubscriptionResp as a list of non-exclusive alternatives

Data type	Cardinality	Description	Applicability
BsfNotification	0..1	It represents the notification of a match event during the creation or modification of the Individual Binding Subscription resource.	
BsfSubscription	1	It represents the Individual PCFBinding Subscription resource.	

5.7 Error handling

5.7.1 General

HTTP error handling shall be supported as specified in clause 5.2.4 of 3GPP TS 29.500 [6].

For the Nbsf_Management Service API, HTTP error responses shall be supported as specified in clause 4.8 of 3GPP TS 29.501 [7]. Protocol errors and application errors specified in table 5.2.7.2-1 of 3GPP TS 29.500 [6] shall be supported for an HTTP method if the corresponding HTTP status codes are specified as mandatory for that HTTP method in table 5.2.7.1-1 of 3GPP TS 29.500 [6].

In addition, the requirements in the following clauses shall apply.

5.7.2 Protocol Errors

In this Release of the specification, there are no additional protocol errors applicable for the Nbsf_Management Service API.

5.7.3 Application Errors

The application errors defined for the Nbsf_Management Service API are listed in table 5.7.3-1.

Table 5.7.3-1: Application errors

Application Error	HTTP status code	Description
MULTIPLE_BINDING_INFO_FOUND	400 Bad Request	Indicates that the BSF found more than one binding resource so it cannot provide the selected PCF to the consumer. (NOTE 1)
EXISTING_BINDING_INFO_FOUND	403 Forbidden	Indicates that the BSF found an existing PCF binding information for the indicated combination or for the applicable MBS Session. (NOTE 2)
NOTE 1: This application error is included in the responses to the GET request. NOTE 2: This application error is included in the responses to the POST request. NOTE 3: Including a "ProblemDetails" data structure with the "cause" attribute in the HTTP response is optional unless explicitly mandated in the service operation clauses.		

5.8 Feature negotiation

The optional features in table 5.8-1 are defined for the Nbsf_Management Service API. They shall be negotiated using the extensibility mechanism defined in clause 6.6 of 3GPP TS 29.500 [6].

Table 5.8-1: Supported Features

Feature number	Feature Name	Description
1	MultiUeAddr	This feature indicates the support of multiple UE addresses (IPv6 prefixes or MAC addresses) in the same binding information.
2	BindingUpdate	The consumer can use this feature for updating the session binding information.
3	SamePcf	This feature indicates the support of same PCF selection for the indicated combination. (NOTE)
4	ES3XX	Extended Support for 3xx redirections. This feature indicates the support of redirection for any service operation, according to Stateless NF procedures as specified in clauses 6.5.3.2 and 6.5.3.3 of 3GPP TS 29.500 [6] and according to HTTP redirection principles for indirect communication, as specified in clause 6.10.9 of 3GPP TS 29.500 [6].
5	ExtendedSamePcf	This feature extends the support of same PCF selection for the indicated combination. This feature requires the support of SamePcf feature. (NOTE)
6	AddSnssaiDnnPair	This feature indicates the support of additional S-NSSAI and DNN pair(s) for which the binding event report(s) apply.
NOTE: The "SamePcf" feature is applicable to the deployments where the N5 and/or Rx interface apply and the UE address is available in the PCF at the creation of the SM Policy Association. The "ExtendedSamePcf" feature is applicable for any PCF deployment, regardless of UE address availability at the creation of SM Policy association and/or N5 and/or Rx applicability.		

5.9 Security

As indicated in 3GPP TS 33.501 [15] and 3GPP TS 29.500 [6], the access to the Nbsf_Management API may be authorized by means of the OAuth2 protocol (see IETF RFC 6749 [16]), based on local configuration, using the "Client Credentials" authorization grant, where the NRF (see 3GPP TS 29.510 [12]) plays the role of the authorization server.

If OAuth2 is used, a n NF Service Consumer, prior to consuming services offered by the Nbsf_Management API, shall obtain a "token" from the authorization server, by invoking the Access Token Request service, as described in 3GPP TS 29.510 [12], clause 5.4.2.2.

NOTE: When multiple NRFs are deployed in a network, the NRF used as authorization server is the same NRF that the NF Service Consumer used for discovering the Nbsf_Management service.

The Nbsf_Management API defines a single scope "nbsf-management" for the entire service, and it does not define any additional scopes at resource or operation level.

Annex A (normative): OpenAPI specification

A.1 General

The present Annex contains an OpenAPI [11] specification of HTTP messages and content bodies used by the Nbsf_Management API.

This Annex shall take precedence when being discrepant to other parts of the specification with respect to the encoding of information elements and methods within the API.

NOTE: The semantics and procedures, as well as conditions, e.g. for the applicability and allowed combinations of attributes or values, not expressed in the OpenAPI definitions but defined in other parts of the specification also apply.

Informative copies of the OpenAPI specification file contained in this 3GPP Technical Specification are available on a Git-based repository, that uses the GitLab software version control system (see clause 5B of the 3GPP TR 21.900 [18] and clause 5.3.1 of the 3GPP TS 29.501 [7] for further information).

A.2 Nbsf_Management API

openapi: 3.0.0

info:

```
version: 1.3.1
title: Nbsf_Management
description: |
  Binding Support Management Service API.
  © 2022, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
  All rights reserved.
```

externalDocs:

```
description: 3GPP TS 29.521 V17.7.0; 5G System; Binding Support Management Service.
url: 'https://www.3gpp.org/ftp/Specs/archive/29_series/29.521/'
```

servers:

```
- url: '{apiRoot}/nbsf-management/v1'
  variables:
    apiRoot:
      default: https://example.com
      description: apiRoot as defined in clause 4.4 of 3GPP TS 29.501.
```

security:

```
- {}
- oAuth2ClientCredentials:
  - nbsf-management
```

paths:

```
/pcfBindings:
  post:
    summary: Create a new Individual PCF for a PDU Session binding information
    operationId: CreatePCFBinding
    tags:
      - PCF Bindings (Collection)
    requestBody:
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/PcfBinding'
    responses:
      '201':
        description: The creation of an individual PCF for a PDU Session binding.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/PcfBinding'
```

```

headers:
  Location:
    description: >
      Contains the URI of the newly created resource, according to the structure
      {apiRoot}/nbsf-management/<apiVersion>/pcfBindings/{bindingId}
    required: true
    schema:
      type: string
'400':
  $ref: 'TS29571_CommonData.yaml#/components/responses/400'
'401':
  $ref: 'TS29571_CommonData.yaml#/components/responses/401'
'403':
  description: >
    The existing PCF binding information stored in the BSF for the indicated combination is
    returned.
  content:
    application/problem+json:
      schema:
        $ref: '#/components/schemas/ExtProblemDetails'
'404':
  $ref: 'TS29571_CommonData.yaml#/components/responses/404'
'411':
  $ref: 'TS29571_CommonData.yaml#/components/responses/411'
'413':
  $ref: 'TS29571_CommonData.yaml#/components/responses/413'
'415':
  $ref: 'TS29571_CommonData.yaml#/components/responses/415'
'429':
  $ref: 'TS29571_CommonData.yaml#/components/responses/429'
'500':
  $ref: 'TS29571_CommonData.yaml#/components/responses/500'
'503':
  $ref: 'TS29571_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29571_CommonData.yaml#/components/responses/default'
get:
  summary: Read PCF for a PDU Session Bindings information
  operationId: GetPCFBindings
  tags:
    - PCF Bindings (Collection)
  parameters:
    - name: ipv4Addr
      in: query
      description: The IPv4 Address of the served UE.
      required: false
      schema:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv4Addr'
    - name: ipv6Prefix
      in: query
      description: >
        The IPv6 Address of the served UE. The NF service consumer shall append '/128' to the
        IPv6 address in the attribute value. E.g. '2001:db8:85a3::8a2e:370:7334/128'.
      required: false
      schema:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Prefix'
    - name: macAddr48
      in: query
      description: The MAC Address of the served UE.
      required: false
      schema:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/MacAddr48'
    - name: dnn
      in: query
      description: DNN.
      required: false
      schema:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
    - name: supi
      in: query
      description: Subscription Permanent Identifier.
      required: false
      schema:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Supi'
    - name: gpsi
      in: query
      description: Generic Public Subscription Identifier
      required: false

```

```

    schema:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
  - name: snssai
    in: query
    description: The identification of slice.
    required: false
    content:
      application/json:
        schema:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
  - name: ipDomain
    in: query
    description: The IPv4 address domain identifier.
    required: false
    schema:
      type: string
  - name: supp-feat
    in: query
    description: To filter irrelevant responses related to unsupported features.
    schema:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
responses:
  '200':
    description: >
      The individual PCF for a PDU Session binding session binding information resource
      matching the query parameter(s) is returned.
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/PcfBinding'
  '204':
    description: >
      There is no PCF for a PDU Session binding information matching the query parameter(s).
  '400':
    $ref: 'TS29571_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29571_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29571_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29571_CommonData.yaml#/components/responses/404'
  '406':
    $ref: 'TS29571_CommonData.yaml#/components/responses/406'
  '414':
    $ref: 'TS29571_CommonData.yaml#/components/responses/414'
  '429':
    $ref: 'TS29571_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29571_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29571_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29571_CommonData.yaml#/components/responses/default'

/pcfBindings/{bindingId}:
  delete:
    summary: Delete an existing Individual PCF for a PDU Session Binding information
    operationId: DeleteIndPCFBinding
    tags:
      - Individual PCF Binding (Document)
    parameters:
      - name: bindingId
        in: path
        description: Represents the individual PCF for a PDU Session Binding.
        required: true
        schema:
          type: string
    responses:
      '204':
        description: >
          No Content. The Individual PCF for a PDU Session Binding information resource is
          deleted.
      '307':
        $ref: 'TS29571_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29571_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29571_CommonData.yaml#/components/responses/400'

```

```

'401':
  $ref: 'TS29571_CommonData.yaml#/components/responses/401'
'403':
  $ref: 'TS29571_CommonData.yaml#/components/responses/403'
'404':
  $ref: 'TS29571_CommonData.yaml#/components/responses/404'
'429':
  $ref: 'TS29571_CommonData.yaml#/components/responses/429'
'500':
  $ref: 'TS29571_CommonData.yaml#/components/responses/500'
'503':
  $ref: 'TS29571_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29571_CommonData.yaml#/components/responses/default'
patch:
  summary: Update an existing Individual PCF for a PDU Session Binding information
  operationId: UpdateIndPCFBinding
  tags:
    - Individual PCF for a PDU Session Binding (Document)
  parameters:
    - name: bindingId
      in: path
      description: Represents the individual PCF for a PDU Session Binding.
      required: true
      schema:
        type: string
  requestBody:
    description: Parameters to update the existing PCF for a PDU Session binding.
    required: true
    content:
      application/merge-patch+json:
        schema:
          $ref: '#/components/schemas/PcfBindingPatch'
  responses:
    '200':
      description: OK (Successful update of the PCF for a PDU Session binding).
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/PcfBinding'
    '307':
      $ref: 'TS29571_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29571_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29571_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29571_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29571_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29571_CommonData.yaml#/components/responses/404'
    '411':
      $ref: 'TS29571_CommonData.yaml#/components/responses/411'
    '413':
      $ref: 'TS29571_CommonData.yaml#/components/responses/413'
    '415':
      $ref: 'TS29571_CommonData.yaml#/components/responses/415'
    '429':
      $ref: 'TS29571_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29571_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29571_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29571_CommonData.yaml#/components/responses/default'
/subscriptions:
  post:
    operationId: CreateIndividualSubscription
    summary: Create an individual subscription for event notifications from the BSF
    tags:
      - Subscriptions (Collection)
    requestBody:
      required: true
      content:
        application/json:
          schema:

```

```

    $ref: '#/components/schemas/BsfSubscription'
responses:
  '201':
    description: Created.
    headers:
      Location:
        description: >
          Contains the URI of the newly created resource, according to the structure
          {apiRoot}/nsmf-management/<apiVersion>/subscriptions/{subId}
        required: true
        schema:
          type: string
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/BsfSubscriptionResp'
  '400':
    $ref: 'TS29571_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29571_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29571_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29571_CommonData.yaml#/components/responses/404'
  '411':
    $ref: 'TS29571_CommonData.yaml#/components/responses/411'
  '413':
    $ref: 'TS29571_CommonData.yaml#/components/responses/413'
  '415':
    $ref: 'TS29571_CommonData.yaml#/components/responses/415'
  '429':
    $ref: 'TS29571_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29571_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29571_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29571_CommonData.yaml#/components/responses/default'
callbacks:
  myNotification:
    '{$request.body#/notifUri}':
      post:
        requestBody:
          required: true
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/BsfNotification'
responses:
  '204':
    description: No Content. Notification was successful.
  '307':
    $ref: 'TS29571_CommonData.yaml#/components/responses/307'
  '308':
    $ref: 'TS29571_CommonData.yaml#/components/responses/308'
  '400':
    $ref: 'TS29571_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29571_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29571_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29571_CommonData.yaml#/components/responses/404'
  '411':
    $ref: 'TS29571_CommonData.yaml#/components/responses/411'
  '413':
    $ref: 'TS29571_CommonData.yaml#/components/responses/413'
  '415':
    $ref: 'TS29571_CommonData.yaml#/components/responses/415'
  '429':
    $ref: 'TS29571_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29571_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29571_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29571_CommonData.yaml#/components/responses/default'

```



```
/subscriptions/{subId}:
  put:
    operationId: ReplaceIndividualSubscription
    summary: Replace an individual subscription for event notifications from the BSF
    tags:
      - IndividualSubscription (Document)
    requestBody:
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/BsfSubscription'
    parameters:
      - name: subId
        in: path
        description: Subscription correlation ID
        required: true
        schema:
          type: string
    responses:
      '200':
        description: OK. Resource was successfully modified and representation is returned.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/BsfSubscriptionResp'
      '204':
        description: No Content. Resource was successfully modified.
      '307':
        $ref: 'TS29571_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29571_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29571_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29571_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29571_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29571_CommonData.yaml#/components/responses/404'
      '411':
        $ref: 'TS29571_CommonData.yaml#/components/responses/411'
      '413':
        $ref: 'TS29571_CommonData.yaml#/components/responses/413'
      '415':
        $ref: 'TS29571_CommonData.yaml#/components/responses/415'
      '429':
        $ref: 'TS29571_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29571_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29571_CommonData.yaml#/components/responses/503'
      default:
        $ref: 'TS29571_CommonData.yaml#/components/responses/default'
    delete:
      operationId: DeleteIndividualSubscription
      summary: Delete an individual subscription for event notifications from the BSF
      tags:
        - IndividualSubscription (Document)
      parameters:
        - name: subId
          in: path
          description: Subscription correlation ID
          required: true
          schema:
            type: string
      responses:
        '204':
          description: No Content. Resource was successfully deleted.
        '307':
          $ref: 'TS29571_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29571_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29571_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29571_CommonData.yaml#/components/responses/401'
        '403':
```

```

    $ref: 'TS29571_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29571_CommonData.yaml#/components/responses/404'
  '429':
    $ref: 'TS29571_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29571_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29571_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29571_CommonData.yaml#/components/responses/default'

```

/pcf-ue-bindings:

```

post:
  summary: Create a new Individual PCF for a UE binding information
  operationId: CreatePCFforUEBinding
  tags:
    - PCF for a UE Bindings (Collection)
  requestBody:
    required: true
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/PcfForUeBinding'
  responses:
    '201':
      description: The creation of an individual PCF for a UE binding.
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/PcfForUeBinding'
      headers:
        Location:
          description: >
            Contains the URI of the newly created resource, according to the structure
            {apiRoot}/nbsf-management/<apiVersion>/pcf-ue-bindings/{bindingId}
          required: true
          schema:
            type: string
    '400':
      $ref: 'TS29571_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29571_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29571_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29571_CommonData.yaml#/components/responses/404'
    '411':
      $ref: 'TS29571_CommonData.yaml#/components/responses/411'
    '413':
      $ref: 'TS29571_CommonData.yaml#/components/responses/413'
    '415':
      $ref: 'TS29571_CommonData.yaml#/components/responses/415'
    '429':
      $ref: 'TS29571_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29571_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29571_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29571_CommonData.yaml#/components/responses/default'

get:
  summary: Read PCF for a UE Bindings information
  operationId: GetPCFforUeBindings
  tags:
    - PCF for a UE Bindings (Collection)
  parameters:
    - name: supi
      in: query
      description: Subscription Permanent Identifier.
      required: false
      schema:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Supi'
    - name: gpsi
      in: query
      description: Generic Public Subscription Identifier
      required: false
      schema:

```

```

    $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
  - name: supp-feat
    in: query
    description: To filter irrelevant responses related to unsupported features.
    schema:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
responses:
  '200':
    description: >
      The individual PCF for a UE binding session binding information resource matching the
      query parameter(s) is returned.
    content:
      application/json:
        schema:
          type: array
          items:
            $ref: '#/components/schemas/PcfForUeBinding'
          minItems: 0
  '400':
    $ref: 'TS29571_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29571_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29571_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29571_CommonData.yaml#/components/responses/404'
  '406':
    $ref: 'TS29571_CommonData.yaml#/components/responses/406'
  '414':
    $ref: 'TS29571_CommonData.yaml#/components/responses/414'
  '429':
    $ref: 'TS29571_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29571_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29571_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29571_CommonData.yaml#/components/responses/default'

/pcf-ue-bindings/{bindingId}:
  delete:
    summary: Delete an existing Individual PCF for a UE Binding information
    operationId: DeleteIndPCFforUEBinding
    tags:
      - Individual PCF for a UE Binding (Document)
    parameters:
      - name: bindingId
        in: path
        description: Represents the individual PCF for a UE Binding.
        required: true
        schema:
          type: string
    responses:
      '204':
        description: >
          No Content. The Individual PCF for a UE binding information resource is deleted.
      '307':
        $ref: 'TS29571_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29571_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29571_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29571_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29571_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29571_CommonData.yaml#/components/responses/404'
      '429':
        $ref: 'TS29571_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29571_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29571_CommonData.yaml#/components/responses/503'
      default:
        $ref: 'TS29571_CommonData.yaml#/components/responses/default'
  patch:
    summary: Update an existing Individual PCF for a UE Binding information

```

```

operationId: UpdateIndPCFforUEBinding
tags:
  - Individual PCF for a UE Binding (Document)
parameters:
  - name: bindingId
    in: path
    description: Represents the individual PCF for a UE Binding.
    required: true
    schema:
      type: string
requestBody:
  description: Parameters to update the existing PCF for a UE binding.
  required: true
  content:
    application/merge-patch+json:
      schema:
        $ref: '#/components/schemas/PcfForUeBindingPatch'
responses:
  '200':
    description: OK. Successful update of the PCF for a PDU Session binding.
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/PcfForUeBinding'
  '307':
    $ref: 'TS29571_CommonData.yaml#/components/responses/307'
  '308':
    $ref: 'TS29571_CommonData.yaml#/components/responses/308'
  '400':
    $ref: 'TS29571_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29571_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29571_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29571_CommonData.yaml#/components/responses/404'
  '411':
    $ref: 'TS29571_CommonData.yaml#/components/responses/411'
  '413':
    $ref: 'TS29571_CommonData.yaml#/components/responses/413'
  '415':
    $ref: 'TS29571_CommonData.yaml#/components/responses/415'
  '429':
    $ref: 'TS29571_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29571_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29571_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29571_CommonData.yaml#/components/responses/default'

/pcf-mbs-bindings:
  post:
    summary: Create a new Individual PCF for an MBS Session binding.
    operationId: CreatePCFMbsBinding
    tags:
      - PCF for an MBS Session Bindings (Collection)
    requestBody:
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/PcfMbsBinding'
    responses:
      '201':
        description: >
          Created. A new Individual PCF for an MBS Session Binding resource is created
          and the corresponding URI is returned in an HTTP Location header.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/PcfMbsBinding'
        headers:
          Location:
            description: >
              Contains the URI of the newly created resource, according to the structure
              {apiRoot}/nbsf-management/v1/pcf-mbs-bindings/{bindingId}
            required: true

```

```

    schema:
      type: string
  '400':
    $ref: 'TS29571_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29571_CommonData.yaml#/components/responses/401'
  '403':

  description: >
    The existing PCF binding information stored in the BSF for the MBS session is
    returned.
  content:
    application/problem+json:
      schema:
        $ref: '#/components/schemas/MbsExtProblemDetails'
  '404':
    $ref: 'TS29571_CommonData.yaml#/components/responses/404'
  '411':
    $ref: 'TS29571_CommonData.yaml#/components/responses/411'
  '413':
    $ref: 'TS29571_CommonData.yaml#/components/responses/413'
  '415':
    $ref: 'TS29571_CommonData.yaml#/components/responses/415'
  '429':
    $ref: 'TS29571_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29571_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29571_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29571_CommonData.yaml#/components/responses/default'

get:
  summary: Retrieve an existing PCF for an MBS Session binding.
  operationId: GetPCFMbsBinding
  tags:
    - PCF for an MBS Session Bindings (Collection)
  parameters:
    - name: mbs-session-id
      in: query
      description: >
        Contains the identifier of the MBS Session to which the requested MBS Session
        binding is related.
      required: true
      content:
        application/json:
          schema:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/MbsSessionId'
    - name: supp-feat
      in: query
      description: >
        Contains the list of features supported by the NF service consumer and used to
        filter irrelevant responses related to unsupported features.
      content:
        application/json:
          schema:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  responses:
    '200':
      description: >
        OK. The Individual PCF for an MBS Session Binding resource(s) matching the provided
        query parameter(s) are returned.
      content:
        application/json:
          schema:
            type: array
            items:
              $ref: '#/components/schemas/PcfMbsBinding'
            minItems: 0
    '400':
      $ref: 'TS29571_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29571_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29571_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29571_CommonData.yaml#/components/responses/404'
    '406':

```

```

    $ref: 'TS29571_CommonData.yaml#/components/responses/406'
  '414':
    $ref: 'TS29571_CommonData.yaml#/components/responses/414'
  '429':
    $ref: 'TS29571_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29571_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29571_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29571_CommonData.yaml#/components/responses/default'

/pcf-mbs-bindings/{bindingId}:
  parameters:
    - name: bindingId
      in: path
      description: >
        Represents the identifier of the Individual PCF for an MBS Session Binding resource.
      required: true
      schema:
        type: string

  patch:
    summary: Request the modification of an existing Individual PCF for an MBS Session Binding
    resource.
    operationId: ModifyIndPCFMbsBinding
    tags:
      - Individual PCF for an MBS Session Binding (Document)
    requestBody:
      description: Parameters to request the modification of the PCF for an MBS Session Binding.
      required: true
      content:
        application/merge-patch+json:
          schema:
            $ref: '#/components/schemas/PcfMbsBindingPatch'
    responses:
      '200':
        description: >
          OK. The Individual PCF for an MBS Session Binding resource is successfully modified and
          a representation of the updated resource is returned in the response body.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/PcfMbsBinding'
      '204':
        description: >
          No Content. The Individual PCF for an MBS Session Binding resource is successfully
          modified and no content is returned in the response body.
      '307':
        $ref: 'TS29571_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29571_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29571_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29571_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29571_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29571_CommonData.yaml#/components/responses/404'
      '411':
        $ref: 'TS29571_CommonData.yaml#/components/responses/411'
      '413':
        $ref: 'TS29571_CommonData.yaml#/components/responses/413'
      '415':
        $ref: 'TS29571_CommonData.yaml#/components/responses/415'
      '429':
        $ref: 'TS29571_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29571_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29571_CommonData.yaml#/components/responses/503'
      default:
        $ref: 'TS29571_CommonData.yaml#/components/responses/default'

  delete:
    summary: Request the deletion of an existing Individual PCF for an MBS Session Binding.
    operationId: DeleteIndPCFMbsBinding

```

```

tags:
- Individual PCF for an MBS Session Binding (Document)
responses:
'204':
  description: >
    No Content. The Individual PCF for an MBS Session Binding resource is successfully Deleted.
'307':
  $ref: 'TS29571_CommonData.yaml#/components/responses/307'
'308':
  $ref: 'TS29571_CommonData.yaml#/components/responses/308'
'400':
  $ref: 'TS29571_CommonData.yaml#/components/responses/400'
'401':
  $ref: 'TS29571_CommonData.yaml#/components/responses/401'
'403':
  $ref: 'TS29571_CommonData.yaml#/components/responses/403'
'404':
  $ref: 'TS29571_CommonData.yaml#/components/responses/404'
'429':
  $ref: 'TS29571_CommonData.yaml#/components/responses/429'
'500':
  $ref: 'TS29571_CommonData.yaml#/components/responses/500'
'503':
  $ref: 'TS29571_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29571_CommonData.yaml#/components/responses/default'

```

components:

```

securitySchemes:
  oAuth2ClientCredentials:
    type: oauth2
    flows:
      clientCredentials:
        tokenUrl: '{nrfApiRoot}/oauth2/token'
        scopes:
          nbsf-management: Access to the Nbsf_Management API

```

schemas:

```

PcfBinding:
  description: Identifies an Individual PCF for a PDU Session binding.
  type: object
  properties:
    supi:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Supi'
    gpsi:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
    ipv4Addr:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv4Addr'
    ipv6Prefix:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Prefix'
    addIpv6Prefixes:
      type: array
      items:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Prefix'
      minItems: 1
      description: The additional IPv6 Address Prefixes of the served UE.
    ipDomain:
      type: string
    macAddr48:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/MacAddr48'
    addMacAddrs:
      type: array
      items:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/MacAddr48'
      minItems: 1
      description: The additional MAC Addresses of the served UE.
    dnn:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
    pcfFqdn:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Fqdn'
    pcfIpEndPoints:
      type: array
      items:
        $ref: 'TS29510_Nnrf_NFManagement.yaml#/components/schemas/IpEndPoint'
      minItems: 1

```

```

    description: IP end points of the PCF hosting the Npcf_PolicyAuthorization service
  pcfDiamHost:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/DiameterIdentity'
  pcfDiamRealm:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/DiameterIdentity'
  pcfSmFqdn:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Fqdn'
  pcfSmIpEndPoints:
    type: array
    items:
      $ref: 'TS29510_Nnrf_NFManagement.yaml#/components/schemas/IpEndPoint'
    minItems: 1
    description: IP end points of the PCF hosting the Npcf_SMPolicyControl service.
  snssai:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
  suppFeat:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  pcfId:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/NfInstanceId'
  pcfSetId:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/NfSetId'
  recoveryTime:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
  paraCom:
    $ref: '#/components/schemas/ParameterCombination'
  bindLevel:
    $ref: '#/components/schemas/BindingLevel'
  ipv4FrameRouteList:
    type: array
    items:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv4AddrMask'
    minItems: 1
  ipv6FrameRouteList:
    type: array
    items:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Prefix'
    minItems: 1
  required:
    - dnn
    - snssai

PcfBindingPatch:
  description: Identifies an Individual PCF binding used in an HTTP Patch method.
  type: object
  properties:
    ipv4Addr:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv4AddrRm'
    ipDomain:
      type: string
      nullable: true
    ipv6Prefix:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6PrefixRm'
    addIpv6Prefixes:
      type: array
      items:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Prefix'
      minItems: 1
      description: The additional IPv6 Address Prefixes of the served UE.
      nullable: true
    macAddr48:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/MacAddr48Rm'
    addMacAddrs:
      type: array
      items:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/MacAddr48'
      minItems: 1
      description: The additional MAC Addresses of the served UE.
      nullable: true
    pcfId:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/NfInstanceId'
    pcfFqdn:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Fqdn'
    pcfIpEndPoints:
      type: array
      items:
        $ref: 'TS29510_Nnrf_NFManagement.yaml#/components/schemas/IpEndPoint'
      minItems: 1
      description: IP end points of the PCF hosting the Npcf_PolicyAuthorization service.

```



```

    pcfDiamHost:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/DiameterIdentity'
    pcfDiamRealm:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/DiameterIdentity'

ParameterCombination:
  description: >
    Represents the combination used by the BSF to check whether there is an existing PCF binding
    information.
  type: object
  properties:
    supi:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Supi'
    dnn:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
    snssai:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'

ExtProblemDetails:
  description: >
    Contains the FQDN or IP endpoints of the existing PCF and the cause value if there is an
    existing PCF binding information for the indicated combination.
  allOf:
    - $ref: 'TS29571_CommonData.yaml#/components/schemas/ProblemDetails'
    - $ref: '#/components/schemas/BindingResp'

MbsExtProblemDetails:
  description: >
    Contains the FQDN or IP endpoints of the existing PCF and the cause value if there is an
    existing PCF binding information for the MBS session.
  allOf:
    - $ref: 'TS29571_CommonData.yaml#/components/schemas/ProblemDetails'
    - $ref: '#/components/schemas/MbsBindingResp'

BindingResp:
  description: Contains the binding information for a PCF for a PDU Session.
  type: object
  properties:
    pcfSmFqdn:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Fqdn'
    pcfSmIpEndPoints:
      type: array
      items:
        $ref: 'TS29510_Nnrf_NFManagement.yaml#/components/schemas/IpEndPoint'
      minItems: 1
      description: IP end points of the PCF hosting the Npcf_SMPolicyControl service.

MbsBindingResp:
  description: Contains the binding information for a PCF for an MBS Session.
  type: object
  properties:
    pcfFqdn:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Fqdn'
    pcfIpEndPoints:
      type: array
      items:
        $ref: 'TS29510_Nnrf_NFManagement.yaml#/components/schemas/IpEndPoint'
      minItems: 1
      description: IP end points of the PCF handling the MBS Session.

BsfSubscription:
  description: Contains the event subscription data.
  type: object
  properties:
    events:
      type: array
      items:
        $ref: '#/components/schemas/BsfEvent'
      minItems: 1
      description: Contain te subscribed events.
    notifUri:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
    notifCorreId:
      type: string
      description: Notification Correlation ID assigned by the NF service consumer.
    supi:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Supi'
    gpsi:

```

```

    $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
  snssaiDnnPairs:
    $ref: '#/components/schemas/SnssaiDnnPair'
  addSnssaiDnnPairs:
    type: array
    items:
      $ref: '#/components/schemas/SnssaiDnnPair'
    minItems: 1
    description: >
      Represents the additional S-NSSAI and DNN pair(s) for which the binding event report(s)
      shall apply.
  suppFeat:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  required:
    - events
    - notifUri
    - notifCorreId
    - supi

BsfNotification:
  description: Contains the event notifications.
  type: object
  properties:
    notifCorreId:
      type: string
      description: Notification Correlation ID assigned by the NF service consumer.
    pcfId:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/NfInstanceId'
    pcfSetId:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/NfSetId'
    bindLevel:
      $ref: '#/components/schemas/BindingLevel'
    eventNotifs:
      type: array
      items:
        $ref: '#/components/schemas/BsfEventNotification'
      minItems: 1
      description: Notifications about Individual Events.
  required:
    - notifCorreId
    - eventNotifs

BsfEventNotification:
  description: Contains an event notification.
  type: object
  properties:
    event:
      $ref: '#/components/schemas/BsfEvent'
    pcfForUeInfo:
      $ref: '#/components/schemas/PcfForUeInfo'
    pcfForPduSessInfos:
      type: array
      items:
        $ref: '#/components/schemas/PcfForPduSessionInfo'
      minItems: 1
      description: The information of the PCF for a PDU session.
    matchSnssaiDnns:
      type: array
      items:
        $ref: '#/components/schemas/SnssaiDnnPair'
      minItems: 1
      description: Matching S-NSSAI and DNN pairs.
  required:
    - event

PcfForUeInfo:
  description: Contains the information of the PCF for a UE.
  type: object
  properties:
    pcfFqdn:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Fqdn'
    pcfIpEndpoints:
      type: array
      items:
        $ref: 'TS29510_Nnrf_NFManagement.yaml#/components/schemas/IpEndPoint'
      minItems: 1
      description: IP end points of the PCF hosting the Npcf_AmPolicyAuthorization service.
    pcfId:

```

```

    $ref: 'TS29571_CommonData.yaml#/components/schemas/NfInstanceId'
  pcfSetId:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/NfSetId'
  bindLevel:
    $ref: '#/components/schemas/BindingLevel'

PcfForPduSessionInfo:
  description: Contains the informaiton of the PCF for a PDU session.
  type: object
  properties:
    dnn:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
    snssai:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
    pcfFqdn:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Fqdn'
    pcfIpEndPoints:
      type: array
      items:
        $ref: 'TS29510_Nnrf_NFManagement.yaml#/components/schemas/IpEndPoint'
      minItems: 1
      description: IP end points of the PCF hosting the Npcf_AmPolicyAuthorization service.
    ipv4Addr:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv4AddrRm'
    ipDomain:
      type: string
    ipv6Prefixes:
      type: array
      items:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Prefix'
      minItems: 1
      description: The IPv6 Address Prefixes of the served UE.
    macAddrs:
      type: array
      items:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/MacAddr48'
      minItems: 1
      description: The MAC Addresses of the served UE.
    pcfId:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/NfInstanceId'
    pcfSetId:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/NfSetId'
    bindLevel:
      $ref: '#/components/schemas/BindingLevel'
  required:
    - snssai
    - dnn

PcfForUeBinding:
  description: Identifies an Individual PCF for a UE binding.
  type: object
  properties:
    supi:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Supi'
    gpsi:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
    pcfForUeFqdn:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Fqdn'
    pcfForUeIpEndPoints:
      type: array
      items:
        $ref: 'TS29510_Nnrf_NFManagement.yaml#/components/schemas/IpEndPoint'
      minItems: 1
      description: IP end points of the PCF hosting the Npcf_AmPolicyAuthorization service.
    pcfId:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/NfInstanceId'
    pcfSetId:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/NfSetId'
    bindLevel:
      $ref: '#/components/schemas/BindingLevel'
    suppFeat:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  required:
    - supi
  anyOf:
    - required: [pcfForUeFqdn]
    - required: [pcfForUeIpEndPoints]

```

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PcfForUeBindingPatch:
  description: Identifies the updates of an Individual PCF for a UE binding.
  type: object
  properties:
    pcfForUeFqdn:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Fqdn'
    pcfForUeIpEndPoints:
      type: array
      items:
        $ref: 'TS29510_Nnrf_NFManagement.yaml#/components/schemas/IpEndPoint'
      minItems: 1
      description: IP end points of the PCF hosting the Npcf_AmPolicyAuthorization service.
    pcfId:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/NfInstanceId'

SnssaiDnnPair:
  description: Contains a S-NSSAI and DNN combination.
  type: object
  required:
    - snssai
    - dnn
  properties:
    dnn:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
    snssai:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'

PcfMbsBinding:
  description: Represents an Individual PCF for an MBS Session binding.
  type: object
  properties:
    mbsSessionId:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/MbsSessionId'
    pcfFqdn:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Fqdn'
    pcfIpEndPoints:
      type: array
      items:
        $ref: 'TS29510_Nnrf_NFManagement.yaml#/components/schemas/IpEndPoint'
      minItems: 1
    pcfId:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/NfInstanceId'
    pcfSetId:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/NfSetId'
    bindLevel:
      $ref: '#/components/schemas/BindingLevel'
    recoveryTime:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
    suppFeat:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  required:
    - mbsSessionId

PcfMbsBindingPatch:
  description: >
    Represents the requested modification to an Individual PCF for an MBS Session binding.
  type: object
  properties:
    pcfFqdn:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Fqdn'
    pcfIpEndPoints:
      type: array
      items:
        $ref: 'TS29510_Nnrf_NFManagement.yaml#/components/schemas/IpEndPoint'
      minItems: 1
    pcfId:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/NfInstanceId'

BindingLevel:
  anyOf:
    - type: string
      enum:
        - NF_SET
        - NF_INSTANCE
    - type: string
      description: >
        This string provides forward-compatibility with future

```

extensions to the enumeration but is not used to encode content defined in the present version of this API.

description: |
Possible values are:
- "NF_SET"
- "NF_INSTANCE"

BsfEvent:
description: Represents an event to be notified by the BSF.
anyOf:
- type: string
enum:
- PCF_PDU_SESSION_BINDING_REGISTRATION
- PCF_PDU_SESSION_BINDING_DEREGISTRATION
- PCF_UE_BINDING_REGISTRATION
- PCF_UE_BINDING_DEREGISTRATION
- SNSSAI_DNN_BINDING_REGISTRATION
- SNSSAI_DNN_BINDING_DEREGISTRATION
- type: string

BsfSubscriptionResp:
description: >
It represents a response to a modification or creation request of an Individual Binding Subscription resource. It may contain the notification of the already met events.
anyOf:
- \$ref: '#/components/schemas/BsfSubscription'
- \$ref: '#/components/schemas/BsfNotification'

Annex B (informative): Deployment option to support BSF and DRA coexistence due to network migration

As described in Annex B of 3GPP TS 23.503 [4], the Diameter Routing Agent (DRA) and the BSF can coexist in an operator's network during the network migration to 5GC. The DRA is described in 3GPP TS 29.213 [14] and can be a service consumer of the Nbsf_Management service.

During the Rx session establishment, the DRA can discover the selected PCF for the related subscriber by using the Nbsf_Management_Discovery service operation to obtain the related PCF address if it has no stored binding information derived from an ongoing Gx session for that subscriber.

NOTE 1: For a UE in the EPC there is a Gx session and the DRA stores the binding information. For a UE in the 5GC the Npcf_SmPolicyControl service is used and the BSF stores the binding information.

NOTE 2: If the DRA has no stored binding information derived from an ongoing Gx session for a subscriber, the DRA needs to request new binding information for each Rx session establishment because the information in the BSF could have changed compared to any previous binding information the DRA requested.

Annex C (informative): Change history

Change history							
Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New version
2018-01						TS skeleton of Binding Support Management Service specification	0.0.0
2018-01						Inclusion of documents agreed in CT3#94 C3-180301, C3-180191, C3-180192 and C3-180193.	0.1.0
2018-03						Inclusion of documents agreed in CT3#95 C3-181350 and C3-181352.	0.2.0
2018-04						Inclusion of documents agreed in CT3#96 C3-182424 and C3-182510.	0.3.0
2018-05						Inclusion of documents agreed in CT3#97 C3-183287, C3-183500, C3-183881, C3-183502 and C3-183733.	0.4.0
2018-06	CT#80	CP-181031				TS sent to plenary for approval.	1.0.0
2018-06	CT#80	CP-181031				TS approved by plenary	15.0.0
2018-09	CT#81	CP-182015	0001	2	F	PCF id correction for BSF	15.1.0
2018-09	CT#81	CP-182015	0002		F	Reference update: OpenAPI specification	15.1.0
2018-09	CT#81	CP-182015	0004	2	F	Clarification on mandatory HTTP error status codes	15.1.0
2018-09	CT#81	CP-182015	0005	6	B	OpenAPI for TS 29.521	15.1.0
2018-09	CT#81	CP-182015	0006	1	F	Description of Structured data types	15.1.0
2018-09	CT#81	CP-182015	0007	1	B	Support of IPv4 overlapping	15.1.0
2018-09	CT#81	CP-182015	0008		F	Correction of the service name	15.1.0
2018-09	CT#81	CP-182015	0009	1	F	Resource structure presentation	15.1.0
2018-12	CT#82	CP-183205	0011		F	Default value for apiRoot Default value for apiRoot	15.2.0
2018-12	CT#82	CP-183205	0012		F	Correction to DELETE Method for Nbsf_Management Service API	15.2.0
2018-12	CT#82	CP-183205	0013		F	Correction to Typos in URI Paths	15.2.0
2018-12	CT#82	CP-183205	0015		F	API version	15.2.0
2018-12	CT#82	CP-183205	0016		F	ExternalDocs OpenAPI field	15.2.0
2018-12	CT#82	CP-183205	0017		F	Location header field in OpenAPI	15.2.0
2018-12	CT#82	CP-183205	0018	1	F	Security	15.2.0
2018-12	CT#82	CP-183205	0019	1	F	supported content types	15.2.0
2018-12	CT#82	CP-183205	0020	2	F	HTTP Error responses	15.2.0
2018-12	CT#82	CP-183205	0021	2	F	DRA as service consumer	15.2.0
2018-12	CT#82	CP-183205	0023		F	Change presence in BSF binding	15.2.0
2018-12	CT#82	CP-183205	0024	1	F	Presence conditions in yaml file	15.2.0
2018-12	CT#82	CP-183205	0025	1	F	Missing 201 response body for POST to /pcfBindings	15.2.0
2019-03	CT#83	CP-190113	0028	2	F	Handling of unsupported query parameter combinations	15.3.0
2019-03	CT#83	CP-190113	0029	1	F	Correction of description of the Nbsf_Management_Register Service and Nbsf_Management_Discovery service operations	15.3.0
2019-03	CT#83	CP-190113	0030		F	BSF resource cleanup	15.3.0
2019-03	CT#83	CP-190113	0031	1	F	Formatting of structured data types in query parameters	15.3.0
2019-03	CT#83	CP-190113	0032	1	F	Correction on the handling of UE addresses	15.3.0
2019-03	CT#83	CP-190110	0033	2	F	Miscellaneous BSF correction	15.3.0
2019-03	CT#83	CP-190140	0034	1	F	OpenAPI Version number update	15.3.0
2019-06	CT#84	CP-191079	0036		F	Remove NSI ID	15.4.0
2019-06	CT#84	CP-191106	0037	5	B	Support multiple UE addresses in one binding	16.0.0
2019-06	CT#84	CP-191106	0038	5	B	Binding update support	16.0.0
2019-06	CT#84	CP-191079	0039	1	F	Precedence of OpenAPI file	15.4.0
2019-06	CT#84	CP-191079	0040	1	F	Copyright Note in YAML files	15.4.0
2019-06	CT#84	CP-191089	0041	1	F	Correction of Location header in Nbsf_Management OpenAPI	16.0.0
2019-06	CT#84	CP-191101	0043	2	F	OpenAPI version number update	16.0.0
2019-09	CT#85	CP-192199	0045	2	F	Session binding for IPv6 addresses	16.1.0
2019-09	CT#85	CP-192156	0046		F	Support multiple UE addresses in BSF	16.1.0
2019-09	CT#85	CP-192152	0047	1	B	IP address handling in wireline access	16.1.0
2019-09	CT#85	CP-192234	0050	2	F	OpenAPI version update TS 29.521 Rel-16	16.1.0
2019-12	CT#86	CP-193197	0053	3	B	Same PCF selection for the same UE ID, S-NSSAI and DNN combination	16.2.0
2019-12	CT#86	CP-193197	0054		F	Update of API version and TS version in OpenAPI file	16.2.0
2020-03	CT#87e	CP-200207	0055	1	B	Update of the same PCF selection	16.3.0
2020-03	CT#87e	CP-200207	0056		B	DNN Clarification	16.3.0
2020-03	CT#87e	CP-200208	0058	2	B	Adding NWDAF as Nbsf_management service consumer	16.3.0
2020-03	CT#87e	CP-200207	0059		F	Resolve editor note for PATCH	16.3.0
2020-03	CT#87e	CP-200207	0060	1	F	Miscellaneous errors	16.3.0
2020-03	CT#87e	CP-200253	0061	1	F	Support of the Update service operation	16.3.0
2020-03	CT#87e	CP-200214	0062		F	OpenAPI: usage of the "tags" keyword	16.3.0
2020-03	CT#87e	CP-200260	0063	1	B	PCF set Id/PCF Id in Nbsf_Management_Register/Update	16.3.0
2020-03	CT#87e	CP-200215	0064		F	Correction on PcfBinding	16.3.0
2020-03	CT#87e	CP-200216	0065		F	Update of OpenAPI version and TS version in externalDocs field	16.3.0
2020-06	CT#88e	CP-201233	0066	1	F	Corrections on SamePcf	16.4.0
2020-06	CT#88e	CP-201246	0067	1	F	Corrections related to UEaddr	16.4.0
2020-06	CT#88e	CP-201259	0068	3	B	Update of PCF address(es)	16.4.0
2020-06	CT#88e	CP-201275	0069	2	B	Clarification of the DS-TT MAC address	16.4.0
2020-06	CT#88e	CP-201228	0070	3	B	Support of full Frame Routing feature	16.4.0

2020-06	CT#88e	CP-201212	0071	1	F	Binding information retrieval: PCF set ID and PCF instance ID	16.4.0
2020-06	CT#88e	CP-201296	0073	2	F	Correct use of application error	16.4.0
2020-06	CT#88e	CP-201228	0074	1	F	Correct IPv6 prefix	16.4.0
2020-06	CT#88e	CP-201244	0076	1	F	Storage of YAML files in ETSI Forge	16.4.0
2020-06	CT#88e	CP-201246	0080	1	F	Adding DRA as Nbsf_management service consumer	16.4.0
2020-06	CT#88e	CP-201258	0081	1	B	Update of PCF address(es)	16.4.0
2020-06	CT#88e	CP-201256	0083	1	F	URI of the Nbsf_Management service	16.4.0
2020-06	CT#88e	CP-201222	0085	1	A	Correction to the condition of BSF service operations	16.4.0
2020-06	CT#88e	CP-201244	0086	1	F	Optionality of ProblemDetails	16.4.0
2020-06	CT#88e	CP-201233	0087	1	F	suppFeat attribute within PcfBinding data	16.4.0
2020-06	CT#88e	CP-201244	0088	1	F	Supported headers, Resource Data type and yaml mapping	16.4.0
2020-06	CT#88e	CP-201255	0090		F	Update of OpenAPI version and TS version in externalDocs field	16.4.0
2020-09	CT#89e	CP-202077	0092		F	Data type corrections	16.5.0
2020-12	CT#90e	CP-203139	0093	1	F	Essential Corrections and alignments	16.6.0
2021-03	CT#91e	CP-210191	0094	1	F	Support of stateless NFs	16.7.0
2021-03	CT#91e	CP-210202	0095		F	Correction to Framed Routing feature	16.7.0
2021-03	CT#91e	CP-210217	0096		F	Storage of YAML files in ETSI Forge	16.7.0
2021-03	CT#91e	CP-210205	0098	1	F	Correction to SamePcf feature	16.7.0
2021-03	CT#91e	CP-210219	0097		F	Adding some missing description fields to data type definitions in OpenAPI specification files	17.0.0
2021-03	CT#91e	CP-210221	0099	1	F	OpenAPI reference	17.0.0
2021-03	CT#91e	CP-210240	0102		F	Update of OpenAPI version and TS version in externalDocs field	17.0.0
2021-06	CT#92e	CP-211234	0103	1	F	Support of optional HTTP custom header fields	17.1.0
2021-06	CT#92e	CP-211219	0105		A	Correction to Overview and Introduction	17.1.0
2021-06	CT#92e	CP-211200	0107	1	A	Redirect responses with "application/json" media type	17.1.0
2021-06	CT#92e	CP-211219	0109	1	A	Correction to ExtendedSamePcf feature	17.1.0
2021-06	CT#92e	CP-211265	0111		F	Update of OpenAPI version and TS version in externalDocs field	17.1.0
2021-09	CT#93e	CP-212225	0113	1	B	Subscription to notification of PCF registration	17.2.0
2021-09	CT#93e	CP-212224	0114		F	Correcting CR #0107 implementation	17.2.0
2021-09	CT#93e	CP-212225	0115	1	B	DCAMP related update of BSF services	17.2.0
2021-09	CT#93e	CP-212225	0116	1	B	DCAMP related updates in the resource structure	17.2.0
2021-09	CT#93e	CP-212225	0119	1	B	Registration and Deregistration of the PCF for a UE	17.2.0
2021-09	CT#93e	CP-212225	0120	1	B	DCAMP related updates in the OpenAPI file	17.2.0
2021-09	CT#93e	CP-212223	0121		F	Update of OpenAPI version and TS version in externalDocs field	17.2.0
2021-12	CT#94e	CP-213194	0122		F	Correction to PCF for a UE binding update procedure	17.3.0
2021-12	CT#94e	CP-213194	0123	1	B	Subscription to PCF registration/deregistration events for multiple DNN and SNNSAI	17.3.0
2021-12	CT#94e	CP-213234	0124		B	Update of BSF NF service consumers	17.3.0
2021-12	CT#94e	CP-213234	0125		B	Clarification to the registered UE address for TSN and non-TSN scenarios.	17.3.0
2021-12	CT#94e	CP-213239	0126		F	Aligning API URI with SBI template	17.3.0
2021-12	CT#94e	CP-213200	0130	1	B	Discover a PCF for a UE	17.3.0
2021-12	CT#94e	CP-213224	0132		A	Correction to PCF Session binding update procedure	17.3.0
2021-12	CT#94e	CP-213239	0135	1	F	Naming Convention	17.3.0
2021-12	CT#94e	CP-213246	0136		F	Update of OpenAPI version and TS version in externalDocs field	17.3.0
2022-03	CT#95e	CP-220197	0137	1	B	Completion of subscription to notification of PCF registration	17.4.0
2022-03	CT#95e	CP-220197	0138	1	F	Clarification of table 4.2.1-1	17.4.0
2022-03	CT#95e	CP-220176	0139	2	A	Alignment of "Application Errors" clause with SBI TS template	17.4.0
2022-03	CT#95e	CP-220197	0140		F	Correction of references to the PCF Session binding resource	17.4.0
2022-03	CT#95e	CP-220197	0142		F	Removal of BindingSubscription data type	17.4.0
2022-03	CT#95e	CP-220194	0143		F	Update of info and externalDocs fields	17.4.0
2022-06	CT#96	CP-221159	0144	1	F	Correction to subscription procedures	17.5.0
2022-06	CT#96	CP-221155	0145	1	F	Update of Fqdn data type definition	17.5.0
2022-06	CT#96	CP-221154	0146		F	Formatting of description fields	17.5.0
2022-06	CT#96	CP-221155	0147	1	F	Update the apiVersion placeholder	17.5.0
2022-06	CT#96	CP-221151	0148		F	Update of info and externalDocs fields	17.5.0
2022-09	CT#97e	CP-222125	0149	1	F	Correction in the handling of features for Nbsf	17.6.0
2022-09	CT#97e	CP-222125	0150	2	F	Routing binding indication in the interactions with the PCF	17.6.0
2022-09	CT#97e	CP-222127	0151	1	F	Corrections to Nbsf_Management_Subscribe service operation	17.6.0
2022-09	CT#97e	CP-222127	0152		F	Corrections to Nbsf_Management_Notify service operation	17.6.0
2022-09	CT#97e	CP-222127	0153	1	F	Replacement of subslid with subld	17.6.0
2022-09	CT#97e	CP-222127	0154		F	Alignment of ipDomain in PcfForPduSessionInfo data type	17.6.0
2022-09	CT#97e	CP-222127	0155	1	F	Correction to PCF address in PcfForUeBinding	17.6.0
2022-09	CT#97e	CP-222127	0156	1	F	Corrections to UE binding information update procedure	17.6.0
2022-09	CT#97e	CP-222127	0157		F	incorrect data structure in PUT response for subscription modification	17.6.0
2022-09	CT#97e	CP-222095	0158	1	B	Updating the service description clauses to support the PCF for a MBS Session binding	17.6.0
2022-09	CT#97e	CP-222095	0159	1	B	Defining the resources part to support the PCF for an MBS Session binding	17.6.0
2022-09	CT#97e	CP-222095	0160	1	B	Defining the data model part to support the PCF for an MBS Session binding	17.6.0

2022-09	CT#97e	CP-222208	0161	1	B	Updating the OpenAPI description part to support the PCF for an MBS Session binding	17.6.0
2022-09	CT#97e	CP-222121	0162	1	F	Update of info and externalDocs fields	17.6.0
2022-12	CT#98e	CP-223167	0164	1	F	adding MBSF as a consumer of Nbsf_Management_Discovery service	17.7.0
2022-12	CT#98e	CP-223167	0165	1	F	missing MBS session binding functionality related description	17.7.0
2022-12	CT#98e	CP-223167	0169	1	F	Correction in Registration of a new PCF for an MBS Session	17.7.0
2022-12	CT#98e	CP-223167	0170	1	F	Correction to service description clauses to support the PCF for a MBS Session binding	17.7.0
2022-12	CT#98e	CP-223197	0173	1	F	Corrections for Nbsf_Management API	17.7.0
2022-12	CT#98e	CP-223188	0174		F	Update of info and externalDocs fields	17.7.0
2023-03	CT#99	CP-230131	0177	1	F	Miscellaneous essential corrections to the MBS related procedures	17.8.0

History

Document history		
V17.4.0	May 2022	Publication
V17.5.0	July 2022	Publication
V17.6.0	September 2022	Publication
V17.7.0	January 2023	Publication
V17.8.0	April 2023	Publication