**3GPP TSG-CT WG4 Meeting #111-eC4-224546**

**E-Meeting, 18th – 26th August 2022 was C4-224213**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  |  | **CR** | **0344** | **rev** | **1** | **Current version:** |  |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network | **X** |

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| ***Title:*** | Binding Indication for the resource bound to a specific NF service instance | | | | | | | | | |
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| ***Source to WG:*** | Ericsson | | | | | | | | | |
| ***Source to TSG:*** | CT4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | SBIProtoc17 | | | | |  | ***Date:*** | | |  |
|  |  | | | |  | |  | | |  |
| ***Category:*** | F |  | | | | | ***Release:*** | | |  |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | As specified in TS29.500, it is not possible to use Binding Indication to indicate that the resource is exclusively bound to a specific NF service instance:  *Binding Indications shall not be used if a particular resource can only be served by a specific NF service instance of an NF instance, i.e. if NF service instances of a same NF service are not capable to share resource inside the NF Instance. A resource for which no Binding Indication or Routing Binding Indication is signalled shall be considered to be bound exclusively to one NF service instance, unless the NF Service resource owner instance is part of an NF set (or AMF set) or an NF service set, or unless its NF profile in the NRF indicates that its supports NF service persistence within the NF instance (see clause 6.5 of 3GPP TS 23.527 [38]).*  The green hightlighted requirements force the receiving NF (consumer or producer) to perform service discovery procedure towards NRF to determine if the resource is really bound to a specific NF service instance, since the producer may not support binding indication.  When the resource is exclusively bound to a specific NF service instance and when the NF service instance has failed, apparently retrieving the NF profile is unnessary extra signalling.  In addition, there are several use cases where a NF may wish to indicate the resource is exclusively bound to a specific NF service instance, so the peer NF may consider to select an alternative NF instead:  1. When a NF service instance is taking out of a set for the following scenarios:  • In Service Software Upgrade, i.e. being upgraded to a software version that makes new created resource be not possible to be shared by other NF service instances without being upgraded in the set;  • Similar for downgrade.  • Maintenance.  For example:  Assuming there are 5 NFs (1, 2, 3, 4 and 5) in the SET, NF1 is being upgraded:  For any existing resource which were handled by the NF1:  it would be better to let other NFs in the same NF set to handle the request, this can be done via Notification request(s) via changing the Preferred binding entity in the binding indication, either per resource or per group of resource if supported; or  at receiving a service request addressing an existing resource created before it is moved out of the SET, using 3xx to redirect.  While for any new request, especially for those requests requires newly upgraded feature, the NF1 should accept the request, since the NF1 is the first NF in the set which has been upgraded, there is no redundancy. This must indicate to the NF service consumer.  2. A NF (service) Set is deployed using a UDSF as centralized database to store the resource information, so any NF in the same (service)set can retrieve the resource information, thus be able to handle the request related to the resource.  However, when the NF temporarily loses the connection towards the UDSF, in this situation any resource created or updated by this NF can not be synchronized and stored in the UDSF, i.e. those resources being newly created or updated can not be served by other NF in the same Set, i.e. they are exclusively bound to a specific NF service instance.  So, it is proposed to introduce a new parameter "no-redundancy" as a boolean to indicate if the resource/session context is exclusively bound to a specific NF service instance in the 3gpp-Sbi-Binding.  3. There may other scenarios where fully relying on the NRF based on service discovery is not possible considering the NF consumer will normally use its local cache until being expired. | | | | | | | | |
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| ***Summary of change:*** | | Introduce a new parameter "no-redundancy" as a boolean to indicate if the resource/session context is exclusively bound to a specific NF service instance in the 3gpp-Sbi-Binding and relevant description for the parameter. | | | | | | | | |
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| ***Consequences if not approved:*** | | Some use cases where a NF wants to indicate the resource is exclusively bound to a specific resource are not supported. | | | | | | | | |
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| ***Clauses affected:*** | | 5.2.3.2.6, 6.12.1 | | | | | | | | |
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|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | | Rev1: wording improvement, e.g. clarifying the no-redundancy is applicable for all scopes. | | | | | | | | |

\* \* \* \* First change \* \* \* \*

##### 5.2.3.2.6 3gpp-Sbi-Binding

This header contains a comma-delimited list of Binding Indications from an HTTP server for storage and subsequent use by an HTTP client (see clause 6.12).

The encoding of the header follows the ABNF as defined in IETF RFC 7230 [12].

3gpp-Sbi-Binding = "3gpp-Sbi-Binding" ":" 1#(OWS "bl=" blvalue 1\*(";" OWS parameter) [";" OWS recoverytime] [";" OWS notif-receiver] [";" OWS "group=" groupvalue] [1\*(";" OWS groupparameter)] [";" OWS "no-redundancy=" no-red-value])

blvalue = "nf-instance" / "nf-set" / "nfservice-instance" / "nfservice-set"

parameter = parametername "=" token

parametername = "nfinst" / "nfset" / "nfservinst" / "nfserviceset" / "servname" / "scope" / "backupamfinst" / "backupnf"

recoverytime = "recoverytime=" OWS DQUOTE date-time DQUOTE

notif-receiver = "nr=" URI ; URI production rule from IETF RFC 3986 [14], Appendix A

groupvalue = "true" / "false"

groupparameter = groupparametername "=" token

groupparametername = "oldgroupid" / "groupid" / "uribase" / "oldnfinst / "oldservset" / "oldservinst" / "guami"

no-red-value = "true"

The following parameters are defined:

- scope: indicates the applicability of a Binding Indication in a service request other than a notification request, or in a notification or callback response. This may take one of the following values:

- "other-service": the binding information applies to other service(s) that the NF Service Consumer may later on provide as an NF Service Producer (see clause 6.12.3);

- "subscription-events": the binding information applies to subscription change event notifications (see clause 6.12.4);

- "callback": the binding information applies to notification or callback requests (see clauses 6.12.4 and 6.12.5).

The absence of this parameter in a Binding Indication in a service request other than a notification request, or in a notification or callback response, shall be interpreted as "callback".  
  
Two scope parameters may be present in a Binding Indication if the binding information applies to notification/callback requests and to other services.

- servname (service name): indicates the name of a service, as defined in 3GPP TS 29.510 [8], or a custom service, i.e.:

- the name of the service that handles a notification or a callback request, when present in a Binding Indication for a subscription or a callback, i.e. with a scope parameter absent or set to "callback"; or

- the name of the other service(s) for which the binding applies, when present in a Binding Indication in a service request for the other services the NF Service Consumer can provide later on as an NF Service Producer, i.e. with the scope parameter set to "other-service". More than one servname parameter may be present to represent multiple such services. The absence of this parameter in a Binding Indication with the scope parameter set to "other-service" shall be interpreted as binding information that applies to all the services that the NF Service Consumer may provide later as an NF Service Producer.

- recoverytime: indicates the recovery timestamp of the entity corresponding to the highest resiliency level supported for the resource, that is, the higher level binding entity indicated in the Binding Indication. See Table 6.3.1.0-1 of 3GPP TS 23.501 [3] and clause 6.1 of 3GPP TS 23.527 [38]. The date-time type is specified in IETF RFC 5322 [37] and clause 7.1.1.1 of IETF RFC 7231 [11].

- nr: indicates the URI of the notification endpoint when this binding information is applicable; it applies to callback requests (see clause 6.12.4); if the notification URI does not contain a correlationID in the path (i.e. it is a common notification URI for multiple subscriptions), the correlationID shall be added as a fragment component of the URI (i.e. following the "#" character) at the end of the URI.

- for the definition and encoding of the blvalue, nfinst, backupamfinst, nfset, nfservinst and nfserviceset see clause 5.2.3.2.5.

- backupnf: indicates the backup NF service instance identifier and/or the backup NF identifier as defined in clause 5.2.2.2.2 or in 3GPP TS 29.510 [8], which shall be used when preferred binding entity is not reachable if supported.

- group: it is a boolean indicating if the binding indication is for a group of resource/session contexts.

- groupid (group id): indicates the group identifier allocated by the NF (service) instance, one ore more resource/session contexts are sharing the same groupid. The groupid is optional and it may be allocated when the resource/session context is created and then be updated afterwards. The groupid is global unique and it may be encoded using the same mechnaism for the NfInstanceId as specificed in 3GPP TS 29.571 [13].

- oldgroupid (old group id): indicates the group identifier allocated by the NF (service) instance previously and to be replaced by the groupid, hence it shall only be present when to update a Binding Indication for multiple contexts. When the if the oldgroupid is present, the groupid shall also be present to indicate the new groupid allocated.

- uribase: identify the apiroot and path segments part in the resource URI or notification/callback URI which is common to multiple contexts. This parameter may only be present when to update a Binding Indication for multiple contexts and when the "group" is set to "true". When included, it indicates that all resources or notification contexts with this uribase will use the updated Binding Indication subsequently. More than one uribase may be present.

- oldnfinst: indicates the NF Instance ID of the NF instance where the group of resource/session contexts are currently served (i.e. the Binding Indication allocated previously for the group of resource/session contexts includes the information of the NF instance), as defined in clause 5.2.2.2.2 in 3GPP TS 29.510 [8]. When included, it indicates that all the resource/session contexts served by this NF instance will use the updated Binding Indication subsequently.

- oldservset: indicates the NF Service Set ID of the NF Service Set where the group of resource/session contexts are currently served (i.e. the Binding Indication allocated previously for the group of resource/session contexts includes the information of the NF Service Set), as defined in clause 5.2.2.2.2 in 3GPP TS 29.510 [8]. When included, it indicates that all the resource/session contexts served by this NF Service Set will use the updated Binding Indication subsequently.

- oldservinst: indicates the NF Service Instance ID of the NF service instance where the group of resource/session contexts are currently served (i.e. the Binding Indication allocated previously for the group of resource/session contexts includes the information of the NF service instance), as defined in clause 5.2.2.2.2 in 3GPP TS 29.510 [8]. When included, it indicates that all the resource/session contexts served by this NF service instance will use the updated Binding Indication subsequently.

- guami (GUAMI): indicates the GUAMI of the AMF currently serving UE contexts, as defined in clause 5.3.4.1 of 3GPP TS 29.571 [13]. When included, it indicates that all the UE contexts associated with the GUMAI will use the updated Binding Indication subsequently.

- no-redundancy: it is a boolean set to true indicating that the resource is exclusively bound to the NF service instance identified in the binding indication. It may be present in a binding with any scope, i.e. "other-service", "subscription-events" or "callback". When this parameter is present, the blvalue shall be set to "nfservice-instance", the nfservinst parameter shall be present and either the nfservset parameter or the nfinst parameter shall be present. The nfservset or nfinst parameter included in the binding indication shall only be used to identify the NF service instance and shall not be considered as a binding entity for reselection. The no-redundancy parameter shall only be signaled if the receiver of this information is known to support this parameter (see clause 6.12.1). Subsequently, when sending further requests targeting a resource with no-redundancy, the HTTP client shall not include any routing binding indication in the request message (to prevent the SCP from performing any reselection).

EXAMPLES 1 to 5: Same as EXAMPLES 1 to 5 defined in clause 5.2.3.2.5, with the header name "3gpp-Sbi-Binding" instead of "3gpp-Sbi-Routing-Binding".

EXAMPLE 6: Subscription request from one NF on behalf of another NF, with 2 binding indications:  
  
3gpp-Sbi-Binding: bl= nf-set; nfset=set1.udmset.5gc.mnc012.mcc345; servname=nudm-ee;scope=subscription-events  
3gpp-Sbi-Binding: bl= nf-set; nfset=set1.nefset.5gc.mnc012.mcc345; servname=nnef-event-exposure

EXAMPLE 7: Service request with 2 binding indications, for callback requests and for other services the NF Service Consumer may provide later as an NF Service Producer:  
  
3gpp-Sbi-Binding: bl=nf-instance; nfinst=54804518-4191-46b3-955c-ac631f953ed8; nfset=set1.smfset.5gc.mnc012.mcc345; servname=nsmf-pdusession  
3gpp-Sbi-Binding: bl=nf-instance; nfinst=54804518-4191-46b3-955c-ac631f953ed8; nfset=set1.smfset.5gc.mnc012.mcc345; scope=other-service; servname=nsmf-event-exposure

EXAMPLE 8: Service request with one binding indication applying to notification/callback requests and to any other services the NF Service Consumer may provide later as an NF Service Producer:  
  
3gpp-Sbi-Binding: bl=nf-set; nfset=set1.region48.amfset.5gc.mnc012.mcc345; scope=callback; scope=other-service

EXAMPLE 9: Service request with one binding indication applying to notification/callback requests together with a recovery time stamp associated with the NF Set indicated in the binding indication and with the binding level set to "nfset":  
3gpp-Sbi-Binding: bl=nfset; nfset=set1.region48.amfset.5gc.mnc012.mcc345; scope=callback; recoverytime= "Tue, 04 Feb 2020 08:49:37 GMT"

EXAMPLE 10: Service response with one binding indication applying to the session context with a recovery time stamp associated with the NF Set indicated in "nfset" in the binding indication and with the binding level set to "nfinstance":  
  
3gpp-Sbi-Binding: bl= nfinstance; nfinst=54804518-4191-46b3-955c-ac631f953ed8; nfset=set1.smfset.5gc.mnc012.mcc345; recoverytime= "Tue, 04 Feb 2020 08:49:37 GMT"

EXAMPLE 11: Service response with one binding indication applying to the session context with a recovery time stamp associated with the NF Instance included the binding indication and with the binding level set to nfserviceinstance:  
  
3gpp-Sbi-Binding: bl=nfserviceinstance; nfservinst=xyz; nfinst=54804518-4191-46b3-955c-ac631f953ed8; recoverytime= "Tue, 04 Feb 2020 08:49:37 GMT"

EXAMPLE 12: Service response with one binding indication applying to the resource context pertaining to a group identified by "54804518-4191-46b3-955c-ac631f953ed1" together with a backup nf:  
  
3gpp-Sbi-Binding: bl= nfinstance; nfinst=54804518-4191-46b3-955c-ac631f953ed0; nfset=set1.smfset.5gc.mnc012.mcc345; groupid=54804518-4191-46b3-955c-ac631f953ed1; backupnf=54804519-4191-46b3-955c-ac631f953ed2

EXAMPLE 13: A notification request message with one binding indication applying to the resource contexts with the oldgroup identifier "54804518-4191-46b3-955c-ac631f953ed1", where the preferred binding entity is changed to "nfinst=54804519-4191-46b3-955c-ac631f953ed0" together with a new group identifier "54804519-4191-46b3-955c-ac631f953ed3" allocated.  
  
3gpp-Sbi-Binding: bl= nfinstance; nfinst=54804519-4191-46b3-955c-ac631f953ed0; nfset=set1.smfset.5gc.mnc012.mcc345; group=true; oldgroupid=54804518-4191-46b3-955c-ac631f953ed1; groupid=54804519-4191-46b3-955c-ac631f953ed3

EXAMPLE 14: A notification request message with one binding indication applying to the resource contexts identified by an uribase, where the preferred binding entity is changed to "nfinst=54804519-4191-46b3-955c-ac631f953ed0":  
  
3gpp-Sbi-Binding: bl= nfinstance; nfinst=54804519-4191-46b3-955c-ac631f953ed0; nfset=set1.smfset.5gc.mnc012.mcc345; group=true; uribase= http%3A%2F%2F10.10.10.10%2Fstringxyz

EXAMPLE 15: A notification request message with one binding indication applying to the resource contexts served by the NF instance identified by "64804518-4191-46b3-955c-ac631f953ed8" where the preferred binding entity is changed to "nfinst=74804519-4191-46b3-955c-ac631f953ed0".  
  
3gpp-Sbi-Binding: bl= nfinstance; nfinst=74804519-4191-46b3-955c-ac631f953ed0; nfset=set1.smfset.5gc.mnc012.mcc345; group=true; oldnfinst=64804518-4191-46b3-955c-ac631f953ed8

EXAMPLE 16: Service request message with an updated binding indication applying to the UE contexts for GUAMI" <mnc(012)><mcc(345)><AmfId("abcd12")> where the backupamfinst is changed.  
  
3gpp-Sbi-Binding: bl=nf-instance; nfinst=54804518-4191-46b3-955c-ac631f953ed7; backupamfinst=54804520-4191-46b3-955c-ac631f953ed8; scope=other-service; group=true; guami={"plmnId":{"mnc":"012","mcc":"345"},"amfId":"abcd12"}

EXAMPLE X: Service response with a binding indication applying to the resource context which is exclusively bound to a specific NF service instance.

3gpp-Sbi-Binding: bl=nfserviceinstance; nfservinst=xyz; nfinst=54804518-4191-46b3-955c-ac631f953ed8; no-redundancy= true

NOTE: Examples 6 and 7 are formatted as two distinct headers (which improves the readability), but they can also be formatted as a single header with two Binding Indication values separated by a comma.

\* \* \* \* Next Change \* \* \* \*

### 6.12.1 General

A Binding Indication for an NF Service Resource may be provided to an NF Service Consumer of the resource as part of the Direct or Indirect Communication procedures, to be used in subsequent related service requests. This allows the NF Service Resource owner to indicate that the NF Service Consumer, for a particular resource, should be bound to an NF service instance, NF instance, NF service set or NF set. See clause 6.3.1.0 of 3GPP TS 23.501 [3] and clause 4.17.12 of 3GPP TS 23.502 [4].

A binding may be established or updated as part of a:

1) service response creating or modifying a resource, to be used for subsequent requests targeting this resource (see clause 4.17.12.2 of 3GPP TS 23.502 [4]), for any API that defines resources;

2) service request, if the NF Service Consumer can also act as an NF Service Producer for later communication from the contacted NF Service Producer, to be used for subsequent service requests initiated by the contacted NF Service Producer (see clause 4.17.12.3 of 3GPP TS 23.502 [4]);

3) service request creating or modifying an explicit or an implicit subscription, or as part of a notification response, to be used for subsequent notification requests initiated by the NF Service Producer (see clause 4.17.12.3 of 3GPP TS 23.502 [4]);

4) service response creating an implicit or explicit subscription or updating a subscription, or as part of a notification request, to be used for subsequent operations on the subscription (see clause 4.17.12.4 of 3GPP TS 23.502 [4]);

5) service request creating a callback (other than notification) resource (e.g. V-SMF or I-SMF callback URI sent to the H-SMF or SMF), or as part of a callback response, to be used for subsequent callback requests initiated by the NF Service Producer (e.g. H-SMF or SMF initiated PDU session modification);

6) callback request sent from a NF Service Producer to update the binding for the resource context, to be used by the NF Service Consumer for subsequent service requests addressing the resource context.

Two types of binding information are defined to manage the binding between an NF Service Consumer and an NF Service Resource:

1) A Binding Indication conveys binding information for a resource which must be stored by the consumer (client) of that resource and used by the client to direct future requests to the resource. When contained in a service request, the binding information is associated with a resource owned by the NF Service Consumer for the current transaction. When contained in a service response, the binding information is associated with a resource owned by the NF Service Producer for the current transaction.

2) A Routing Binding Indication conveys binding information to direct a request from a client to a server which has the context. A Routing Binding Indication shall only be contained in an HTTP request.

A same service request may convey more than one Binding Indication, e.g.:

- to provide bindings for notification or callback (i.e. bullets 3 or 5) and for other services that the NF service consumer can provide later as a NF Service Producer (i.e. bullet 2); or

- to provide binding information for different event notifications, when creating a subscription on behalf of another NF (see clause 6.12.4).

The scope parameter in a Binding Indication in a service request (or notification or callback response) identifies the applicability of (i.e. scenario associated with) the binding information.

A service request may convey one or more Binding Indications as described above using a 3gpp-Sbi-Binding header and/or include a Binding Routing Indication to influence routing of the request e.g. to an appropriate set of NF Service Producers or to an appropriate service set of the NF Service Producer using a 3gpp-Sbi-Routing-Binding header. A service response may convey a Binding Indication for a resource using a 3gpp-Sbi-Binding header.

NOTE 1: An HTTP request can contain for instance one 3gpp-Sbi-Binding header containing two Binding Indications for other services and for callbacks, and one 3gpp-Sbi-Routing-Binding header conveying a Routing Binding Indication.

Once a binding indication has been received for a particular resource or scope, the absence of a binding indication for the same resource or scope in a subsequent request/response message shall be interpreted as meaning that the earlier received binding indication for that resource or scope has not changed, unless specified otherwise in the rest of the specification (see scenarios with NF service producer or consumer change further down, and clause 6.12.4 for inter-AMF mobility scenarios).

In scenarios with NF service producer change (e.g. V-SMF or I-SMF change), the NF service consumer (e.g. AMF) shall delete any earlier binding indication received from the old NF service producer (e.g. old V-SMF/I-SMF) for the producer's resource (e.g. SM context resource) and replace it by any new binding indication possibly received from the new NF service producer (e.g. new V-SMF/I-SMF).

In scenarios with NF service consumer change (e.g. inter-AMF mobility), the NF service producer (e.g. SMF) shall delete any earlier binding indication received from the old NF service consumer (e.g. binding indication for callback request received from the old AMF) and replace it by any new binding indication possibly received from the new NF service consumer (e.g. new AMF).

If an SCP receives a Routing Binding Indication within a service or notification request and decides to forward that request to a next-hop SCP, it shall include the Routing Binding Indication in the forwarded request. The SCP shall remove the Routing Binding Indication if it forwards the request to the target NF.

Binding Indications and Routing Binding Indications shall include the Binding level and one or more Binding entity IDs representing all NF service instances that are capable to serve service requests targeting the resource, i.e. that share the same resource contexts.

The Binding Level indicates a preferred binding to either a NF Instance, a NF set, a NF Service Instance or a NF Service Set.

When sending a request targeting the resource context in a NF Service Producer or the session context in a NF Service Consumer, the resource URI received in the Location header or the Notification/Callback URI shall be used first if available to set the "3gpp-Sbi-Target-apiRoot" header or target URI; as an exception, if the binding indication earlier received for the target resource context or session context indicates a binding level of "NF service set", "NF Instance" or "NF Set" and alternative NF service instances within the preferred binding entity corresponding to the binding level are available, the request may alternatively be sent to one of these alternative NF service instances. When the URI received in the Location header or the Notification/Callback URI is not reachable or when becoming aware of a NF Service Producer or Consumer change as specified in bullet 3 of clauses 6.5.3.2 and 6.5.3.3, the binding entity corresponding to the binding level shall be selected whenever possible. If this is not possible, e.g. because the preferred binding entity is not reachable, the request should be sent to any other Binding entity signalled in the Binding Indication or Routing Binding Indication, in the following decreasing order of priority:

- select an NF service instance if available in the backup NF instance, if a backup NF service instance and/or backup NF instance was signalled in the Binding Indication or Routing Binding Indication;

- select an NF service instance in the same NF service set, if a NF service Set ID was signalled in the Binding Indication or Routing Binding Indication;

- select an equivalent NF service instance in the same NF instance, if an NF instance ID was signalled in the Binding Indication or Routing Binding Indication;

- select an NF service instance in an equivalent NF service set of the backup AMF instance, if a NF service Set ID and backup AMF Instance ID was signalled in the Binding Indication or Routing Binding Indication;

- select an equivalent NF service instance in the backup AMF instance, if backup AMF Instance ID was signalled in the Binding Indication or Routing Binding Indication;

- select an NF service instance in an equivalent NF service set of another NF instance of the NF set, if an NF Service Set ID and an NF Set ID were signalled in the Binding Indication or Routing Binding Indication;

- select an equivalent NF service instance in another NF instance of the NF Set, if an NF Set ID was signalled in the Binding Indication or Routing Binding Indication.

NOTE 2: NF service instances from different NF instances are equivalent NF service instances if they share the same MCC, MNC, NID (for SNPN), ServiceName, API version, and, if applicable, NF Service Set ID (see clause 28.13 of 3GPP TS 23.003 [15]).

Binding Indications shall not be used if a particular resource can only be served by a specific NF service instance of an NF instance, i.e. if NF service instances of a same NF service are not capable to share resource inside the NF Instance, unless the receiver of the Binding Indication has indicated its support of the no-redundancy indication in the Binding Indication in the SupportFeatures attribute for a specific API (see clause 5.2.3.2.6). A resource for which no Binding Indication or Routing Binding Indication is signalled shall be considered to be bound exclusively to one NF service instance, unless the NF Service resource owner instance is part of an NF set (or AMF set) or an NF service set, or unless its NF profile in the NRF indicates that its supports NF service persistence within the NF instance (see clause 6.5 of 3GPP TS 23.527 [38]).

An NF service producer supporting different sets of NF service instances, e.g. serving different network slices, shall include the NF Service Set ID in the Binding Indication to enable the reselection (when required) of an alternative NF service instance from the same or an equivalent NF service set. See also clause 6.10.3.2 for requirements on the inclusion of "3gpp-Sbi-Discovery-\*" headers in service requests targeting an existing resource context in the NF service producer.

A Binding Indication may be shared by multiple resource/session contexts, i.e. these resource contexts (in the NF Service Producer) or session contexts (in the NF Service Consumer) are sharing the same resilience information. The Binding Indication for multiple contexts has the same semantics as the one for a single resource/session context but with the following additions. When it is supported as indicated in the Supported Features for a specific service API:

- both NF Service Consumer and NF Service Producer can indicate if the Binding Indication for multiple contexts; and if the Binding Indication is for multiple contexts, the "group" parameter in the Binding Indication shall be set to "true";

- a group id may be included in the Binding Indication to indicate the group to which resource/session contexts pertain are sharing the same Binding Indication, when the resource/session context is created;

- the Binding Indication for a group of contexts may be updated towards each Resource URI with different apiRoot part (representing different peer NF (service) instances) or towards each Notification URI with different authority part, or with the same authority part but different callback-uri-prefix (see clause 5.2.3.3.7) if it is provided in 3gpp-Sbi-Consumer-Info header when the NF service consumer provides the Callback URI, e.g. when the NF is changed, by including an oldgroupid, oldnfinst, oldservset, oldservinst or uribase to address applicable contexts for the update of the Binding Indication. When the oldgroupid is present, the groupid shall also be present to indicate the new group id which is newly allocated. Additionally, the Binding Indication may be updated for a group of UE contexts by including the gumai to address applicable UE contexts for the update of the Binding Indication.

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