**3GPP TSG-SA/WG2 Meeting #137E *S2-2001889***

 **2020-02-24 -- 2020-02-27, Electronic Meeting**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
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|  | **23.501** | **CR** | **2021** | **rev** | **3** | **Current version:** | **16.3.0** |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network | **X** |

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|  |
| ***Title:***  | Binding for notification reselection corrections |
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| ***Source to WG:*** | Ericsson, Nokia, Nokia Shanghai-Bell |
| ***Source to TSG:*** | SA2 |
|  |  |
| ***Work item code:*** | 5G\_eSBA |  | ***Date:*** | 2020-02-18 |
|  |  |  |  |  |
| ***Category:*** | F |  | ***Release:*** | Rel-16 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)Rel-12 (Release 12)**Rel-13 (Release 13)Rel-14 (Release 14)Rel-15 (Release 15)Rel-16 (Release 16)* |
|  |  |
| ***Reason for change:*** | Missing aspects of binding information and its usage.It is wrongly indicated that the service name may be used as the unique value in the Binding indication.It is not indicated how the Binding indication is used once received.CR 23.502#1961 ([S2-2001320](https://www.3gpp.org/ftp/tsg_sa/WG2_Arch/TSGS2_136AH_Incheon/Docs/S2-2001320.zip)) has already been agreed, but related 23.501 updates are still missing:An NF service consumer may subscribe via another network function for notifications. And that two binding indications are then required. For example, NF\_A may subscribe to NF\_B on behalf of NF\_C. NF\_A additionally subscribe to subscription related events.Further, If the NF as a NF consumer provides a Binding Indication for services that the NF produces in service requests, it is ambiguous to which services the binding indication relates.As the binding for notifications and the binding for other services could be described in the same request message, and even binding for several different other services could be provided, those cases need to be kept apart for unambiguous signalling. |
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| ***Summary of change:*** | It is corrected that the service name is only possible to be used in combination to other id in the Binding indication, not as an isolated value, It is indicated the usage of the Binding indication (it is used to discover alternative notification endpoints).Clarification that the Routing Binding indication.The Binding Indication in request messages may be associated with an applicability. |
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| ***Consequences if not approved:*** | Unclear handling of binding information likely to create incompatible interpretations of specifications |
|  |  |
| ***Clauses affected:*** | 6.3.1.0, 7.1.2 |
|  |  |
|  | **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:*** |  |

\*\*\* START CHANGES \*\*\*

1st change

#### 6.3.1.0 Principles for Binding, Selection and Reselection

Binding can be used to indicate suitable target NF producer instance(s) for NF service instance selection, reselection and routing of subsequent requests associated with a specific NF producer resource (context) and NF service. This allows the NF producer to indicate that the NF consumer, for a particular context, should be bound to an NF service instance, NF instance, NF service set or NF set depending on local policies and other criteria (e.g. at what point it is in the middle of a certain procedure, considering performance aspects etc).

Binding can also be used by the NF consumer to indicate suitable NF consumer instance(s) for notification target instance reselection and routing of subsequent notification requests associated with a specific notification subscription and for providing binding indication for service(s) that the NF consumer produces for the same data context and the NF service producer is subsequently likely to invoke.

The Binding Indication contains the information in Table 6.3.1.0-1.

The Routing Binding Indication may be included in Request, Subcsribe or Notification messages (see clause 7.1.2). It can be used in case of indirect communication by the SCP to route the message. The Routing Binding Indication is a copy of the information in the Binding Indication.

NOTE x: Subscription request messages can contain both a Binding Indication and a Routing Binding Indication.The NF service producer may provide a Binding Indication to the NF service consumer as part of the Direct or Indirect Communication procedures, to be used in subsequent related service requests. The level of Binding Indication provided by the NF service producer to the NF consumer indicates if the resource in the NF service producer is either bound to NF service instance, NF instance, NF Service Set or NF set as specified in Table 6.3.1.0-1. The Binding Indication may include NF Service Set ID, NF Set ID, NF instance ID, or NF service instance ID, for use by the NF consumer or SCP for NF Service Producer (re-)selection. If the resource is created in the NF Service Producer, the NF Service Producer provides resource information which includes the endpoint address of the NF service producer. For indirect communication, the NF service consumer copies the Binding Indication into the Routing Binding Indication in Request or Subscribe message .

During explicit or implicit notification subscription, a Binding Indication may be provided by the NF service consumer to NF service producer; the NF service consumer will also provide a Notification Endpoint. The NF service consumer may also provide a Binding Indication in response to notification requests. The level of Binding Indication provided by the NF service consumer to the NF service provider indicates if the notification endpoint is either bound to NF service instance, NF instance, NF Service Set or NF set as specified in Table 6.3.1.0-1. The Binding Indication shall include at least one of NF Set ID, NF instance ID, NF Service Set ID and/or NF service instance ID, and may also include the service name. The NF Service Set ID, NF service instance ID, and service name relate to the service of the NF service consumer that will handle the notification.

NOTE z: The NF service can either be a standardised service as per this specification or a custom service. The custom service can be used for the sole purpose of registering endpoint address(es) to receive notifications at the NRF.

The Binding Indication is used by the NF service producer as notification sender to reselect the NotificationEndpoint, i.e. the URI where the notification is to be sent, e.g. if the provided Notification Endpoint included in the subscription cannot be reached, according to the following:

* If the service name in the Binding Indication is omitted and the binding for notification is on NF Set or NF Instance level, the endpoint address of the NF registered in the NRF at NF Profile level shall be used to construct a new Notification Endpoint

- If the service name in the Binding Indication indicates a service, an endpoint address registered in the NRF for that service in the NF profile shall be used to construct a new Notification Endpoint

For indirect communication, the NF service producer copies the Binding information into the Routing Binding Indication that is included in the Notification request, to be used by the SCP to discover an alternative notification endpoint.

For subscription to notifications via another network function, a separate subscription for subscription related events can be provided; two Binding Indications for notifications are then provided and the Binding Indication for notifications to subscription related events shall be associated with an applicability indicating notification for subscription events.

If the NF as a NF consumer provides a Binding Indication for services that the NF produces in service requests, it shall associate that Binding Indication with an applicability indicating other service and may provide the related service name(s) within that Binding Indication, in addition to the other parameters listed in Table 6.3.1.0-1. If no service name(s) are provided, the Binding Indication relates to all services that the NF produces.

For NF Set or NF Instance level of binding, a Binding Indication for notifications and other services may be combined if it relates to the same service, and that combined Binding Indication shall then be associated with an applicability indicating all scenarios that the Binding Indication relates to (For this purpose, the applicability can indicate a combination of values).

If no applicability is indicated in a request or subscribe messages, a Binding Indication in that messages is applicable for notification to non-subscription events.

NOTE z1: Such a request message can be used for implicit subscription.

NOTE z2: Non-subscription events relate to all events except for the events of a separate subscription for subscription related events in case of a subscription to notifications via another network function (see subclause 4.17.12.4 of TS 23.502 [3]).

NOTE z3: Request messages can contain both the Binding Indications for services and for notifications, and in addition, the Routing Binding Indication.

Table 6.3.1.0-1 defines the selection and reselection behaviour of NF services consumers and SCPs depending on the binding indication provided by an NF service producer. The detailed procedures refer to clause 4.17.11 and 4.17.12 of TS 23.502 [3]

Table 6.3.1.0-1: Binding, selection and reselection

|  |  |  |  |
| --- | --- | --- | --- |
| Level of Binding indication | The NF Consumer / Notification sender / SCP selects | The NF Consumer / Notification sender / SCP can reselect e.g. when selected producer is not available | Binding information for selection and re-selection |
| **NF Service Instance** | The indicated NF Service Instance | An equivalent NF Service instance:- within the NF Service Set (if applicable)- within the NF instance- within the NF Set (if applicable) | NF Service Instance ID, NF Service Set ID, NF Instance ID, NF Set ID, Service name (NOTE 4) |
| **NF Service Set** | Any NF Service instance within the indicated NF Service Set | Any NF Service instance within an equivalent NF Service Set within the NF Set (if applicable)(Note 2) | NF Service Set ID, NF Instance ID, NF Set ID, Service name (NOTE 4) |
| **NF Instance** | Any equivalent NF Service instance within the NF instance. | Any equivalent NF Service instance within a different NF instance within the NF Set (if applicable) | NF Instance ID, NF Set ID, Service name (NOTE 4) |
| **NF Set** | Any equivalent NF Service instance within the indicated NF Set | Any equivalent NF Service instance within the NF Set | NF Set ID, Service name (NOTE 4) |
| NOTE 1: if the Binding Indication is not available, the NF Consumer/SCP routes the service request to the target based on routing information available.NOTE 2: NF Service Sets in different NFs are considered equivalent if they include same type and variant (e.g. identical NF Service Set ID) of NF Services.NOTE 3: If a Routing Binding Indication is not available, the SCP routes the service request to the target based on available routing information.NOTE 4: The service name is only applicable if the Binding Indication relates to a notification target or If the NF as a NF consumer provides a Binding Indication for services that the NF produces. |

\*\*\* NEXT CHANGE \*\*\*

2nd change

### 7.1.2 NF Service Consumer - NF Service Producer interactions

The end-to-end interaction between two Network Functions (Consumer and Producer) within this NF service framework follows two mechanisms, irrespective of whether Direct Communication or Indirect Communication is used:

- "Request-response": A Control Plane NF\_B (NF Service Producer) is requested by another Control Plane NF\_A (NF Service Consumer) to provide a certain NF service, which either performs an action or provides information or both. NF\_B provides an NF service based on the request by NF\_A. In order to fulfil the request, NF\_B may in turn consume NF services from other NFs. In Request-response mechanism, communication is one to one between two NFs (consumer and producer) and a one-time response from the producer to a request from the consumer is expected within a certain timeframe. The NF Service Producer may also add a Binding Indication (see clause 6.3.1.0) in the Response, which may be used by the NF Service Consumer to select suitable NF service producer instance(s) for subsequent requests. For indirect communication, the NF Service Consumer copies the Binding Indication into the Routing Binding indication, that is included in subsequent requests, to be used by the SCP to discover a suitable NF service producer instance(s).



Figure 7.1.2-1: "Request-response" NF Service illustration

- "Subscribe-Notify": A Control Plane NF\_A (NF Service Consumer) subscribes to NF Service offered by another Control Plane NF\_B (NF Service Producer). Multiple Control Plane NFs may subscribe to the same Control Plane NF Service. NF\_B notifies the results of this NF service to the interested NF(s) that subscribed to this NF service. The subscription request shall include the notification endpoint, i.e. Notification Target Address) and a Notification Correlation ID (e.g. the notification URL) of the NF Service Consumer to which the event notification from the NF Service Producer should be sent to.

NOTE 1: The notification endpoint URL can contain both the notification endpoint and the Notification Correlation ID.

 The NF Service Consumer may add a Binding Indication (see clause 6.3.1.0) in the subscribe request, which may be used by the NF Service Producer to discover a suitable notification endpoint. For indirect communication, the NF Service Producer copies the Binding Indication into the Routing Binding indication, that is included in the response, to be used by the SCP to discover a suitable notification target. The NF Service Producer may also add a Binding Indication (see clause 6.3.1.0) in the subscribe response, which may be used by the NF Service Consumer (or SCP) to select suitable NF service producer instance(s) or NF producer service instance. In addition, the subscription request may include notification request for periodic updates or notification triggered through certain events (e.g., the information requested gets changed, reaches certain threshold etc.). The subscription for notification can be done through one of the following ways:

- Explicit subscription: A separate request/response exchange between the NF Service Consumer and the NF Service Producer; or

- Implicit subscription: The subscription for notification is included as part of another NF service operation of the same NF Service; or

- Default notification endpoint: Registration of a notification endpoint for each type of notification the NF consumer is interested to receive, as a NF service parameter with the NRF during the NF and NF service Registration procedure as specified in TS 23.502 [3] clause 4.17.1.

 The NF Service Consumer may also add a Binding Indication (see clause 6.3.1.0) in the response to the notification request, which may be used by the NF Service Producer to discover a suitable notification endpoint. For indirect communication, the NF Service Producer copies the Binding Indication into the Routing Binding indication, that is included in the response, to be used by the SCP to discover a suitable notification target.



Figure 7.1.2-2: "Subscribe-Notify" NF Service illustration 1

 A Control Plane NF\_A may also subscribe to NF Service offered by Control Plane NF\_B on behalf of Control Plane NF\_C, i.e. it requests the NF Service Producer to send the event notification to another consumer(s). In this case, NF\_A includes the notification endpoint, i.e. Notification Target Address) and a Notification Correlation ID, of the NF\_C in the subscription request. NF\_A may also additionally include the notification endpoint and a Notification Correlation ID of NF A associated with subscription change related Event ID(s), e.g. Subscription Correlation ID Change, in the subscription request, so that NF\_A can receive the notification of the subscription change related event. The NF\_A may add Binding Indication (see clause 6.3.1.0) in the subscribe request.



Figure 7.1.2-3: "Subscribe-Notify" NF Service illustration 2

Routing of the messages for the NF interaction mechanisms above may be direct, as shown in the figures 7.1.2-1 to 7.1.2-3, or indirect. In case of Indirect Communication, an SCP is employed by the NF service consumer. The SCP routes messages between NF service consumers and NF service producers and may do discovery and associated selection of the NF service producer on behalf of a NF service consumer. Figure 7.1.2-4 shows the principle for a request-response interaction and figure 7.1.2-5 shows an example of a subscribe-notify interaction.



Figure 7.1.2-4: Request response using Indirect Communication



Figure 7.1.2-5: Subscribe-Notify using Indirect Communication

NOTE: The subscribe request and notify request can be routed by different SCPs.

\*\*\* END CHANGES \*\*\*

End of changes