**3GPP TSG-CT WG4 Meeting #111-eC4-224xxx**

**E-Meeting, 18th – 26th August 2022 *Revision of C4-224310***

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **29.531** | **CR** | **0140** | **rev** | **1** | **Current version:** | **17.5.0** |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network | **X** |

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| ***Title:*** | Cleanup of the service operation description | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei | | | | | | | | | |
| ***Source to TSG:*** | CT4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | TEI17 | | | | |  | ***Date:*** | | | 2022-07-04 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | F |  | | | | | ***Release:*** | | | Rel-17 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | The current description of the service operation and procedure includes more and more scenarios and parameters in the same paragraph, which is difficult to understand.  The description needs to be reconstructed. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Reconstruct the service operation definition | | | | | | | | |
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| ***Consequences if not approved:*** | | The readable of the specification remains strange which may lead to misunderstandings. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 5.2.1, 5.2.2.2.2, 5.2.2.2.3, 5.2.2.2.4, 5.3.1, 5.3.2.2.1, 5.3.2.3.1, 5.3.2.3.2, 5.3.2.5.1 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | | This contribution does not change the OpenAPI. | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

\* \* \* First Change \* \* \* \*

### 5.2.1 Service Description

The Nnssf\_NSSelection service is used by an NF Service Consumer (e.g. AMF or NSSF in a different PLMN) to retrieve the information related to network slice in the non-roaming and roaming case.

It also enables the NSSF to provide to the AMF the Allowed NSSAI and the Configured NSSAI for the Serving PLMN.

It also enables the NSSF to provide to the AMF the NSAG information associated with the Configured NSSAI for the Serving PLMN.

The NF service consumer discovers the NSSF based on the local configuration. The NSSF in a different PLMN is discovered based on the self-constructed FQDN as specified in 3GPP TS 23.003 [9].

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

##### 5.2.2.2.2 Get service operation of Nnssf\_NSSelection service

In this procedure, the NF Service Consumer (e.g. AMF) retrieves the slice selection information including the Allowed NSSAI, Configured NSSAI, target AMF Set or the list of candidate AMF(s) and other optional information.

This service operation shall also be used to retrieve the slice mapping information including the mapping of S-NSSAI(s) of the VPLMN to corresponding HPLMN S-NSSAI(s), e.g. during inter-PLMN mobility procedure and/or mobility procedure within VPLMN from EPS to 5GS.



Figure 5.2.2.2.2-1: Retrieve the network slice information during the mobility procedure

1 The AMF shall send a GET request to the NSSF.

If the AMF wants to retrieve the slice selection information, one or more of the following parameters shall be included in the slice-info-request-for-registration query parameter:

- Requested NSSAI and Subscribed S-NSSAI(s) with the indication if marked as default S-NSSAI and the associated subscribed NSSRG information;

- optionally UE support of subscription-based restrictions to simultaneous registration of network slice feature Indication;

- UDM indication to provide all subscribed S-NSSAIs for UEs not indicating support of subscription-based restrictions to simultaneous registration of network slices feature;

- Indication of the support of NSAG by the UE.

If the AMF wants to retrieve the slice mapping information, the following parameters shall be included in the slice-info-request-for-registration query parameter:

- sNssaiForMapping IE and;

- requestMapping IE.

In both scenarios, the AMF shall also include the following parameters in the message:

- PLMN ID of the SUPI in roaming scenarios;

- TAI;

- NF type of the NF service consumer and;

- Requester ID.

2a On success, "200 OK" shall be returned when the NSSF is able to find authorized network slice information for the requested network slice selection information, the response body shall include a payload body containing at least the following parameters:

- Allowed NSSAI and;

- target AMF Set or the list of candidate AMF(s).

The payload body may additionally contain the following parameters:

- a target AMF Service Set;

- Target NSSAI.

"200 OK" shall also be returned when the NSSF is able to find the requested slicing mapping information, the response body shall include a payload body containing the mapping of S-NSSAI(s) of the VPLMN to corresponding HPLMN S-NSSAI(s) included in the allowedNssaiList IE.

NSSFs of a PLMN that implement AMF reallocation via RAN by supporting the NGAP REROUTE NAS REQUEST procedure (see clause 8.6.5 of 3GPP TS 38.413 [21]) should return the target AMF set ID in its response. The NSSF may query the NRF to discover target AMF Set if this information is not known by other means (e.g. if not provided by AMF during Nnssf\_NSSAIAvailability\_Update service operation).

If subscribed NSSRG list is provided, the NSSF shall provide the compatible S-NSSAIs in the Allowed NSSAI as defined in clause 5.15.12 of 3GPP TS 23.501 [2] and compatible S-NSSAIs in the Target NSSAI (if provided).

If the request indicated that UE does not support subscription-based restrictions to simultaneous registration of network slice feature, and UDM has requested to provide all subscribed S-NSSAIs for such UEs, Configured NSSAI, if included, shall be provided ignoring the NSSRG restrictions.

If the AMF has indicated the support of NSAG by the UE, the NSSF shall include the "nsagInfoList" attribute with NSAG information if available.

2b If no slice instances can be found for the requested slice selection information or the requested slice mapping information, then the NSSF shall return a 403 Forbidden response with the "ProblemDetails" IE containing the Application Error "SNSSAI\_NOT\_SUPPORTED" (cf. Table 6.1.7.3-1).

On failure or redirection, the NSSF shall return one of the HTTP status codes together with the response body listed in Table 6.1.3.2.3.1-3.

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

##### 5.2.2.2.3 Get service operation of Nnssf\_NSSelection service during the PDU session establishment

In this procedure, the NF Service Consumer (e.g. AMF) retrieves the NRF and the optionally the NSI ID of the network slice instance:



Figure 5.2.2.2.3-1: Retrieve the network slice information during the PDU session establishment procedure

1 The NF Service consumer (e.g. AMF or NSSF in the different PLMN) shall send a GET request to the NSSF.

The request shall include query parameters, contain at least the following parameters:

- S-NSSAI;

- S-NSSAI from the HPLMN that maps to the S-NSSAI from the Allowed NSSAI of the Serving PLMN;

- the NF type of the NF service consumer;

- Requester ID and;

- non-roaming/LBO roaming/HR roaming indication.

For the request towards an NSSF in the Serving PLMN, the query parameters shall also contain the PLMN ID of the SUPI and TAI.

2a On success, "200 OK" shall be returned when the NSSF is able to find network slice instance information for the requested network slice selection information, the response body shall include a payload body containing at least the NRF to be used to select NFs/services within the selected Network Slice instance;

2b If no slice instances can be found for the requested slice selection information, then the NSSF shall return a 403 Forbidden response with the "ProblemDetails" IE containing the Application Error "SNSSAI\_NOT\_SUPPORTED" (cf. Table 6.1.7.3-1).

On failure or redirection, the NSSF shall return one of the HTTP status codes together with the response body listed in Table 6.1.3.2.3.1-3.

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

##### 5.2.2.2.4 Get service operation of Nnssf\_NSSelection service during UE configuration update procedure

In this procedure, the NF Service Consumer (e.g. AMF) retrieves network slice configuration information (e.g. the Allowed NSSAI and the Configured NSSAI) during the UE configuration update procedure.



Figure 5.2.2.2.4-1: Retrieve the network slice information during UE configuration update procedure

1 The NF Service consumer (e.g. AMF) shall send a GET request to the NSSF. The request shall include query parameters:

- Subscribed S-NSSAI(s) with the indication if the S-NSSAI is marked as default S-NSSAI and the associated subscribed NSSRG information;

- optionally UE support of subscription-based restrictions to simultaneous registration of network slice feature Indication;

- UDM indication to provide all subscribed S-NSSAIs for UEs not indicating support of subscription-based restrictions to simultaneous registration of network slices feature;

- Rejected S-NSSAI(s) for the Registration Area;

- PLMN ID of the SUPI;

- TAI;

- Indication of the support of NSAG by the UE;

- NF type of the NF service consumer and;

- the NF instance ID of the requester NF.

NOTE: When the AMF invokes UE Configuration Update procedure to determine the Target NSSAI to redirect the UE to the dedicated frequency band(s) for an S-NSSAI (as specified in clause 5.3.4.3.3 of 3GPP TS 23.501 [2]), the AMF provides the Allowed NSSAI and the rejected S-NSSAI(s) for the current Registration Area to the NSSF; the Allowed NSSAI and Rejected S-NSSAI(s) for the RA does not include any S-NSSAI that failed for Network Slice-Specific Authentication and Authorization. The AMF does not include the Requested NSSAI to the NSSF in this procedure, thus the NSSF will not provide Allowed NSSAI again to the AMF in the response.

2a On success, "200 OK" shall be returned when the NSSF is able to find authorized network slice information for the requested network slice selection information, the response body shall include a payload body containing at least the following parameters:

- Allowed NSSAI;

- Configured NSSAI and;

- optionally Target NSSAI.

If subscribed NSSRG list is provided, the NSSF shall provide the compatible S-NSSAIs in the Allowed NSSAI as defined in the clause 5.15.12 of 3GPP TS 23.501 [2] and compatible S-NSSAIs in the Target NSSAI(if provided).

If the request indicated that UE does not support subscription-based restrictions to simultaneous registration of network slice feature, and UDM has requested to provide all subscribed S-NSSAIs for such UEs, the NSSF shall provide Configured NSSAI ignoring the NSSRG restrictions.

If the AMF has indicated the support of NSAG by the UE, the NSSF shall include the "nsagInfoList" attribute with NSAG information if available.

2b If no slice instances can be found for the requested slice selection information, then the NSSF shall return a 403 Forbidden response with the "ProblemDetails" IE containing the Application Error "SNSSAI\_NOT\_SUPPORTED" (cf. Table 6.1.7.3-1).

On failure or redirection, the NSSF shall return one of the HTTP status codes together with the response body listed in Table 6.1.3.2.3.1-3.

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

### 5.3.1 Service Description

The Nnssf\_NSSAIAvailability service is used by the NF service consumer (e.g AMF) to update the S-NSSAI(s) the AMF supports on a per TA basis on the NSSF, subscribe and unsubscribe the notification of any changes to the NSSAI availability information on a per TA basis, of the S-NSSAIs available per TA (unrestricted) and the restricted S-NSSAI(s) per PLMN in that TA in the serving PLMN of the UE.

It also enables the NF service consumer (e.g. AMF) to update the NSAG(s) associated with the S-NSSAI(s) supported by the AMF on a per TA basis.

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

##### 5.3.2.2.1 General

The Update operation shall be used by an NF Service Consumer (e.g. AMF) to update the NSSF with the S-NSSAIs the NF service consumer (e.g. AMF) supports per TA, and get the availability of the S-NSSAIs per TA for the S-NSSAIs the NF service consumer (e.g. AMF) supports.

The Update operation may also be used by an NF Service Consumer (e.g. AMF) to update the NSSF with the NSAG(s) associated with the S-NSSAI(s) supported by the NF Service Consumer (e.g. AMF) on per TA basis, and to get the availability of the NSAG(s) per TA for the NSAG(s) supported by the NF Service Consumer (e.g. AMF).



Figure 5.3.2.2.1-1: Update the S-NSSAIs the AMF supports per TA

1. The NF service consumer (e.g. AMF) shall send a PUT request to the resource representing the NSSAI Availability information of the individual NF, identified by the {nfId}, to replace or create the NSSAI Availability information of the NF.

The payload of the body shall contain the NssaiAvailabilityInfo which contains one or more representations of the individual supportedSnssai information to be replaced.

The NssaiAvailabilityInfo in the payload of the body may contain NSAG information.

The NF service consumer (e.g. AMF) shall send a PATCH request to the resource representing the NSSAI Availability information of the individual NF, identified by the {nfId}, to update the NSSAI Availability information of the NF.

The payload of the body shall contain the PatchDocument which contains one or more PatchItem instructions for updating the individual supportedSnssai resources.

The payload of the body may contain the PatchDocument which contains one or more PatchItem instructions for updating the NSAG information.

2. On success, "204 No content" shall be returned if Authorized NSSAI Availability is empty after the update; otherwise, "200 OK" shall be returned, the payload body of the PUT/PATCH response shall contain the representation describing the status of the request and the complete AuthorizedNssaiAvailabilityData information representing the current state of the AuthorizedNssaiAvailabilityInfo.

If there is no supported S-NSSAIs authorized by the NSSF for the TA, the NSSF shall not return the AuthorizedNssaiAvailabilityData for the corresponding TA in the response.

On failure or redirection, the NSSF shall return one of the HTTP status code together with the response body listed in Table 6.2.3.2.3.1-2 / Table 6.2.3.2.3.2-2.

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

##### 5.3.2.3.1 Creation of a subscription

The Subscribe Operation is used by a NF Service Consumer (e.g. AMF) to subscribe to a notification of any changes in status of the NSSAI availability information (e.g. S-NSSAIs available per TA and the restricted S-NSSAI(s) per PLMN in that TA in the serving PLMN of the UE) upon this is updated by another AMF.



Figure 5.3.2.3.1-1 Create a subscription

1. The NF Service Consumer shall send a POST request to create a subscription resource in the NSSF. The payload body of the POST request shall contain a representation of the individual event subscription resource to be created in the NssfEventSubscriptionCreateData.

The request may contain an expiry time, suggested by the NF Service Consumer as a hint, representing the time upto during which the subscription is desired to be kept active and describes the maximum duration after which the subscribed event shall stop generating report.

The request may also indicate a specific AMF Set to restrict the subscriptions to notifications applicable to the AMF Set (i.e. notifications related to S-NSSAIs supported by the AMF Set).

2. On success, "201 Created" shall be returned, and the payload body of the POST response shall contain the representation describing the status of the created subscription in NssfEventSubscriptionCreatedData that may contain the AuthorizedNssaiAvailabilityData information, if available.

If there is no supported S-NSSAIs authorized by the NSSF for the TA, the NSSF shall not return the AuthorizedNssaiAvailabilityData for the corresponding TA in the response.

The Location header shall contain the location (URI) of the created subscription resource.

The response, based on operator policy and taking into account the expiry time included in the request, may contain the expiry time, as determined by the NSSF, after which the subscription becomes invalid. Once the subscription expires, if the NF Service Consumer wants to keep receiving notifications, it shall create a new subscription in the NSSF. The NSSF shall not provide the same expiry time for many subscriptions in order to avoid all of them expiring and recreating the subscription at the same time. If the expiry time is not included in the response, the NF Service Consumer shall consider the subscription to be valid without an expiry time.

On failure or redirection, the NSSF shall return one of the HTTP status code together with the response body listed in Table 6.2.3.3.3.1-2.

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

##### 5.3.2.3.2 Modification of a subscription

The Subscribe Operation may be used by a NF Service Consumer (e.g. AMF) towards an NSSF supporting the SUMOD feature, when it needs to modify an existing subscription previously created by itself at the AMF.

The NF Service Consumer shall modify the subscription by using HTTP method PATCH with the URI of the individual subscription resource to be modified.



Figure 5.3.2.3.2-1 Modify a subscription

1. The NF Service Consumer (e.g. AMF) shall send a PATCH request to the resource URI identifying the individual subscription resource. The payload of the body shall contain the PatchDocument which contains one or more PatchItem instructions for updating the subscription data.

The NF Service Consumer shall not change the event IE included in the NssfEventSubscriptionCreateData by invoking the PATCH request message.

The taiList IE may only be set to an empty array in PATCH request if the NF service consumer and NSSF support the ONSSAI feature.

2. On success, "200 OK" shall be returned, the payload body of the PATCH response shall contain the representation describing the updated subscription in NssfEventSubscriptionCreatedData.

If there is no supported S-NSSAIs authorized by the NSSF for the TA, the NSSF shall not return the AuthorizedNssaiAvailabilityData for the corresponding TA in the response.

On failure or redirection, the NSSF shall return one of the HTTP status code together with the response body listed in Table 6.2.3.4.3.2-2.

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

##### 5.3.2.5.1 General

The Notify Service operation shall be used by the NSSF to update the NF Service Consumer (e.g. AMF) with any change in status, on a per TA basis, of the S-NSSAIs available per TA (unrestricted) and the S-NSSAIs restricted per PLMN in that TA in the serving PLMN of the UE.



Figure 5.3.2.5.1-1: Update the AMF with any S-NSSAIs restricted per TA

1. The NSSF shall send a POST request to the resource representing the NSSF availability resource in the NF service consumer (e.g. AMF). The payload body of the POST request shall contain the one representations of the individual NssfEventNotification resource.

If there is no supported S-NSSAIs authorized by the NSSF for the TA, the NSSF shall not return the AuthorizedNssaiAvailabilityData for the corresponding TA in the notification.

If there is no supported S-NSSAIs authorized by the NSSF for all TAs and the NF Service Consumer has indicated support of "EANAN" feature, the NSSF shall set authorizedNssaiAvailabilityData attribute to an empty array.

If the notification is triggered by the AMF that updates the supported S-NSSAIs per TA by using the Update operation, the NSSF shall not send the notification to the same AMF.

2. On success, "204 No Content" shall be returned and the payload body of the POST response shall be empty.

On failure or redirection, the NF service consumer shall return one of the HTTP status code together with the response body listed in Table 6.2.5.2.3.1-2.

\* \* \* End of Changes \* \* \* \*