**3GPP TSG-CT WG4 Meeting #111-eC4-224197v1**

**E-Meeting, 18th – 26th August 2022**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  |  | **CR** |  | **rev** |  | **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:*** |  | | | | | | | | | |
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| ***Source to WG:*** |  | | | | | | | | | |
| ***Source to TSG:*** | CT4 | | | | | | | | | |
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| ***Work item code:*** |  | | | | |  | ***Date:*** | | |  |
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| ***Category:*** |  |  | | | | | ***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:*** | | SA2 has answered CT4’s question in their LS (i.e. S2-2204903 / C4-224030), sayning that: the access type indicated in NSAC request is not used by the NSAC procedure for controlling the number of UEs, instead it is used in the NSAC procedure for controlling the number of PDU sessions.  On the other hand, in clause 5.15.11.1 of 23.501 it stats that: “*If the Access Type provided by the AMF is configured for NSAC in the NSACF and the maximum number is reached, the NSACF sends a reject response to the AMF including the access type.*”  In 29.536, currently there are two NSAC failure reasons (EXCEED\_MAX\_UE\_NUM\_3GPP / EXCEED\_MAX\_UE\_NUM\_N3GPP) defined for controlling the number of UEs, which may give hint to readers that individual slice quota is configured for 3GPP / Non-3GPP.  It needs clarification that these two failure reasons are just to indicate 3GPP (Non-3GPP) access is configured for NSAC in the NSACF. How the AMF utilizes the access information indicated in these failure reasons are implementation specific. | | | | | | | | |
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| ***Summary of change:*** | | Following changes are made:  - In clause 5.2.2.2.2, clarify the returned failure reason in NSAC procedure for controlling the number of UEs.  - In clause 6.1.6.3.5, clarify that if the failure reeasons of EXCEED\_MAX\_UE\_NUM\_3GPP / EXCEED\_MAX\_UE\_NUM\_N3GPP is returned in NSAC response message, how the NF service consumer (e.g. AMF) utilize the access inforation is not specified. | | | | | | | | |
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| ***Consequences if not approved:*** | | Stage 3 specification is not aligned with stage 2, and may easily cause error implementation. | | | | | | | | |
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| ***Clauses affected:*** | | 5.2.2.2.2, 6.1.6.3.5 | | | | | | | | |
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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 does not introduce any change to the OpenAPI file. | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

\* \* \* Begin of Changes \* \* \* \*

##### 5.2.2.2.2 Network slice admission control for controlling the number of UEs

The NF Service Consumer (e.g. AMF, combined SMF+PGW-C) shall invoke the NumOfUEsUpdate service operation to request the NSACF to perform network slice admission control procedure related to the number of UEs, by using the HTTP POST method as shown in Figure 5.2.2.2.2-1.



Figure 5.2.2.2.2-1: NSAC procedure for controlling the number of UEs

1. The NF Service Consumer (e.g. AMF, combined SMF+PGW-C) shall send a POST request to the resource representing the network slice admission control related to the number of UEs (i.e. …/slices/ues) in the NSACF.

The payload body of the POST request shall contain the input data structure (i.e. UeACRequestData) for network slice admission control, which shall contain the following information:

- the SUPI(s) of the UE(s);

- the access type, over which the UE registers to the network or deregisters from the network;

- a list of S-NSSAIs which are subject to NSAC, and for each S-NSSAI an update flag indicates the operation to that S-NSSAI;

- the NF Instance ID, identifying the requester NF.

In addition, the POST request may also contain:

- the EAC notification callback URI. The AMF may provide the EAC notification callback URI at the first interaction with the NSACF, or may provide an updated one in later interactions when it changes. If the EAC notification callback URI is set to null value by the AMF in later interactions, it means the AMF unsubscribes the EAC notification from the NSACF;

- the additional access type, if the UE deregisters from the network over both 3GPP access and Non-3GPP access.

The update flag shall be set to "INCREASE" for a UE to be registered to a specific slice, and shall be set to "DECREASE" for a UE to be deregistered from a specific slice.

For NSAC of roaming UEs, the NF Service Consumer (e.g. AMF) shall provide the S-NSSAI in serving PLMN, and the corresponding mapped S-NSSAI in home PLMN to the NSACF in serving PLMN.

NOTE 1: When multiple S-NSSAIs are supported by a NSACF and multiple S-NSSAIs are required for NSAC for a given UE where EAC mode is active for at least one S-NSSAI, how the AMF triggers NSAC procedure to this NSACF is implementation specific, e.g. the AMF triggers NSAC procedure for all these supported S-NSSAIs before the Registration Accept message or the UE Configuration Update message.

2a. For each S-NSSAI included in UeACRequestData, the NSACF shall perform the following actions:

- if the update flag is set to "INCREASE", the NSACF shall check whether the UE is already in the UE registration list stored in the NSACF and whether the total number of UEs to this slice will exceed the maximum number of UEs allowed to be registered to this slice:

- if the UE ID is already recorded in the UE registration list but the requester NF is not recorded in the UE registration list, the NSACF shall create a new entry for the UE registration associated with the requester NF and shall also maintain the existing UE registration entries. The total number of UEs registered to this slice is not updated;

- if the UE ID is not recorded in the UE registration list and the total number of UEs (including the UEs indicated in the request and the UEs already stored in the NSACF) does not exceed the maximum number of UEs allowed to be registered to this slice, the NSACF records the indicated UEs to the UE registration list stored in the NSACF, and updates the total number of UEs registered to this slice accordingly;

- if the UE ID is not recorded in the UE registration list and if the total number of UEs will exceed the maximum number of UEs allowed to be registered to this slice, the NSACF shall not record the UE into the UE registration list stored in the NSACF, and shall not update the total number of UEs. Instead, the NSACF shall record this S-NSSAI in the failed list of S-NSSAI in the response message, together with an appropriate value of AcuFailureReason (e.g. "EXCEED\_MAX\_UE\_NUM" as specified in clause 6.1.6.3.5);

- if the update flag is set to "DECREASE" and if the UE is recorded in the UE registration list, the NSACF shall remove the indicated UEs from the UE registration list stored in the NSACF. If there are two or more UE registration entries associated with the UE ID, the NSACF shall only remove the entry associated with the requester NF. After removal, if a UE is no longer recorded in the UE registration list, the NSACF shall decrease the total number of UEs registered to this slice.

- If the update flag is set to "DECREASE" and if the UE is not recorded in the UE registration list, the NSACF shall not decrease the total number of UEs registered to this slice and shall return successful handling for this UE registration.

The NSACF may be configured to perform per access type network slice admission control. In this case, the NSACF shall check whether the access type provided by the NF Service Consumer is configured for NSAC for the indicated S-NSSAI to control the number of UEs. If the access type is not configured for NSAC for the indicated S-NSSAI, the NSACF shall skip the above handling for increasing/decreasing the number of UEs and return successful for this S-NSSAI. If the access type is configured for NSAC for the indicated S-NSSAI, the NSACF shall perform the above handling taking the access type into account and record/remove the UE registration associated with the access type. If the total number of UEs will exceed the maximum number of UEs allowed to be registered to this slice, the NSACF shall record this S-NSSAI in the failed list of S-NSSAI in the response message, together with an appropriate value of AcuFailureReason (e.g. "EXCEED\_MAX\_UE\_NUM" as specified in clause 6.1.6.3.5).

If the NSACF is not configured to perform per access type network slice admission control, the NSACF may perform network slice admission control without taking access type into account. For example, the NSACF is configured with a total quota for the PLMN, but the network slice admission control is not specific to one access type. The NSACF shall record the access type(s) associated with the UE registration. The NSACF shall remove the corresponding UE registration entry when the UE deregisters from all access types.

NOTE 2: For each S-NSSAI that is applicable for NSAC, the NSACF is configured with a total quota for the PLMN. However, the network slice admission control may be configured to apply for one specific access type or both access types.

If in above NSACF handling not all S-NSSAIs are successful, "200 OK" shall be returned, with necessary response data indicating the failed S-NSSAI and the failure reason, e.g. "EXCEED\_MAX\_UE\_NUM".

If in above NSACF handling all S-NSSAIs are successful, "204 No Content" shall be returned which could represent the maximum number of UEs for the S-NSSAI not reached.

NOTE 3: If the PLMN has multiple service areas and there are multiple NSACFs deployed for the network slice, each NSACF may be configured with the maximum number of UEs of the network slice within its service area, e.g. as per operator policy. How to split or synchronize the threshold in multiple NSACFs is left to implementation. Whether and how to guarantee session continuity when a UE moves to new service area with a different NSACF are left to implementation.

NOTE 4: If the NF Service Consumer is AMF, the NSACF may subscribe to AMF Status Change Notifications (e.g. AMF unavailability) via the NRF and update the NF ID accordingly, as described in clause 4.2.11.2 of 3GPP TS 23.502 [3].

2b. On failure, the appropriate HTTP status code (e.g. "403 Forbidden") indicating the error shall be returned.

A ProblemDetails IE shall be included in the payload body of POST response, with the "cause" attribute of ProblemDetails set to application error codes specified in table 6.1.3.2.3.1-1.

2c. On redirection, "307 Temporary Redirect" or "308 Permanent Redirect" shall be returned. A RedirectResponse IE shall be included in the payload body of POST response.

When the procedure is used to perform admission control for a number of UEs, when e.g. NSAC is enabled or disabled for an already live slice, then based on operator policy AMF may allow or disallow sessions for which NSACF returned a reject.

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

##### 6.1.6.3.5 Enumeration: AcuFailureReason

The enumerationAcuFailureReason indicates the operation result of the NSAC procedure for an individual S-NSSAI. It shall comply with the provisions defined in table 6.1.6.3.5-1.

Table 6.1.6.3.5-1: Enumeration AcuFailureReason

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| --- | --- | --- |
| Enumeration value | Description | Applicability |
| "SLICE\_NOT\_FOUND" | Indicates that an S-NSSAI is not found by the NSACF from the list of S-NSSAIs which are subject to NSAC procedure. |  |
| "EXCEED\_MAX\_UE\_NUM" | Indicates for an S-NSSAI the number of UEs has exceeded the configured maximum number of UEs, if network slice admission control is not specific to one access type. |  |
| "EXCEED\_MAX\_UE\_NUM\_3GPP" | Indicates for an S-NSSAI the number of UEs has exceeded the configured maximum number of UEs, if network slice admission control is required for 3GPP access.  (NOTE) |  |
| "EXCEED\_MAX\_UE\_NUM\_N3GPP" | Indicates for an S-NSSAI the number of UEs has exceeded the configured maximum number of UEs, if network slice admission control is required for Non-3GPP access.  (NOTE) |  |
| "EXCEED\_MAX\_PDU\_NUM" | Indicates for an S-NSSAI the number of PDU sessions has exceeded the configured maximum number of PDU sessions if network slice admission control is not specific to one access type. |  |
| "EXCEED\_MAX\_PDU\_NUM\_3GPP" | Indicates for an S-NSSAI the number of PDU sessions has exceeded the configured maximum number of PDU sessions, if network slice admission control is required for 3GPP access. |  |
| "EXCEED\_MAX\_PDU\_NUM\_N3GPP" | Indicates for an S-NSSAI the number of PDU sessions has exceeded the configured maximum number of PDU sessions, if network slice admission control is required for Non-3GPP access. |  |
| NOTE: If this value is returned in the NSAC response message, how the NF service consumer (e.g. AMF) utilizes the access information carried in the AcuFailureReason value is implementation specified. | | |

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