**3GPP TSG-SA2 Meeting #147-e** ***S2-2107329r01***

**Online, , 18th Oct 2021 – 22nd Oct 2021**

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
|  |
|  | **23.501** | **CR** | **3283** | **rev** | **-** | **Current version:** | **17.2.0** |  |
|  |
| *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:***  | NSAC procedure when multiple APNs associated with same S-NSSAI |
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| ***Source to WG:*** | NEC,Huawei, HiSilicon |
| ***Source to TSG:*** | SA2 |
|  |  |
| ***Work item code:*** | eNS\_Ph2 |  | ***Date:*** | 2021-10-11 |
|  |  |  |  |  |
| ***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 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-15 (Release 15)Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)* |
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| ***Reason for change:*** | When UE has a PDN connection established for an APN associated with a S-NSSAI which is subject to the EPS counting and another PDN connection is being established for a different APN but assciated with the same S-NSSAI and the same PGW-C+SMF is involved, then PGW-C+SMF only invokes a request to update the no of PDU session count. Because the UE is already successfully registered to the NSCAF for the PGW-C+SMF. Also sending no. of UE count will unnecessary increase the signaling between the PGW-C+SMF and NSCAF. |
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| ***Summary of change:*** | Specify that the PGW-C+SMF only invokes a request to update no. of PDU sesssion count for a S-NSSAI, When it is establishing a PDN connection for an APN associated with the S-NSSAI and the PGW-C+SMF already have a PDN connection established for the UE for a APN associate the S-NSSAI. |
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| ***Consequences if not approved:*** | The PGW-C+SMF will unnecessarily sends a request to register the UE to the NSCAF for the no. of UE when it has been already registered there for the same. Redundant procedure is executed. |
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| ***Clauses affected:*** | 5.15.11.5 |
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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's revision history:*** |  |

#### 5.15.11.5 Support of Network Slice Admission Control and Interworking with EPC

If EPS counting is required for a network slice, the Network Slice Admission Control for maximum number of UEs and/or for maximum number of PDU Sessions per network slice is performed at the time of PDN connection establishment in case of EPC interworking. To support the NSAC for maximum number of UEs and/or for maximum number of PDU Sessions per network slice in EPC, the SMF+PGW-C is configured with the information indicating which network slice is subject to NSAC. During PDN connection establishment in EPC, the SMF+PGW-C selects an S-NSSAI associated with the PDN connection as described in clause 5.15.7.1. If the selected S-NSSAI by the SMF+PGW-C is subject to the NSAC, the SMF+PGW-C triggers interaction with NSACF to check the availability of the network slice by invoking separate NSAC procedures for number of UE and number of PDU Session (as described in clause 4.11.5.9 of TS 23.502 [3]), before the SMF+PGW-C provides the selected S-NSSAI to the UE. If the network slice is available, the SMF+PGW-C continues to proceed with the PDN connection establishment procedure.

The NSACF performs the following for checking network slice availability prior to returning a response to the SMF+PGW-C:

- For NSAC for number of UEs, if the UE identity is already included in the list of UE IDs registered with a network slice, or the UE identity is not included in the list of UE IDs registered with a network slice and the current number of UE registration did not reach the maximum number, the NSACF responds to the SMF+PGW-C with the information that the network slice is available. The NSACF includes the UE identity in the list of UE IDs if not already on the list and increases the current number of UE registration. Otherwise, the NSACF returns a response indicating that the maximum number with the network slice has been reached.

- For NSAC for number of PDU Sessions, if the current number of PDU sessions is below the maximum number, the NSACF responds to the SMF+PGW-C with the information that the network slice is available. The NSACF increases the current number of PDU sessions. Otherwise, the NSACF returns the response indicating that the maximum number with the network slice has been reached.

If the maximum number of UEs and/or the maximum number of PDU sessions has already been reached, unless operator policy implements a different action, the SMF+PGW-C rejects the PDN connection.

NOTE 1: As an implementation option, if the APN is mapped to more than one S-NSSAI and the first selected S-NSSAI is not available (e.g. either current number of UE registration reached maximum or current number of PDU sessions reached maximum), then based on the operator policy the PGW-C+SMF can try another mapped S-NSSAI for the PDN connection establishment procedure.

If the establishment/release of a new PDN Connections is associated with a different SMF+PGW-C from the SMF+PGW-C used for already existing PDN connection associated with the same S-NSSAI, each SMF+PGW-C will send a request for update (e.g. increase or decrease) to the NSACF for maximum number of UEs. If the establishment/release of a new PDN Connections is associated with same SMF+PGW-C from the SMF+PGW-C used for already existing PDN connection associated with the same S-NSSAI, the SMF+PGW-C skips to send a request for update (e.g. increase or decrease) to the NSACF for maximum number of UEs until this is the last PDN connection to the indicated SMF+PGW-C.The NSACF maintain a registration entry per SMF+PGW-C for the same UE ID.

The SMF+PGW-C provides the Access Type to the NSACF when triggering a request to increase or decrease the number of UEs and/or the number of PDU Sessions for an S-NSSAI.

NOTE 2: The SMF+PGW-C determines the Access Type based on the RAT type parameter in the PMIP or GTP message received from the ePDG; or alternatively it can internally determine the Access Type based on the source node (e.g. SGW) sending the request for the PDN Connection establishment.

When the UE with ongoing PDN connection(s) moves from EPC to 5GC, the SMF+PGW-C triggers a request to decrease the number of the UE registration in NSACF and the AMF triggers a request to increase the number of the UE registration in NSACF when the UE is registered in the new AMF. If there are more than one PDN connections associated with the S-NSSAI, the NSACF may receive multiple requests for the same S-NSSAI from different SMF+PGW-Cs. When the UE with ongoing PDU session(s) moves from 5GC to EPC, the SMF+PGW-C triggers a request to increase the number of the UE registration in NSACF and the old AMF triggers a request to decrease the number of the UE registration in NSACF when the UE is deregistered in old AMF. If there are more than one PDU sessions associated with the S-NSSAI, the NSACF may receive multiple requests for the same S-NSSAI from different SMF+PGW-Cs. The NSACF maintains a list of UE IDs based on the requests from SMF+PGW-C(s) and AMF, and adjusts the current number of registrations accordingly.

When EPS counting is performed for a network slice, and the UE with ongoing PDN connection(s) moves from EPC to 5GC, session continuity is guaranteed from NSAC standpoint, as the admission was granted at the time of PDN connection establishment, i.e. the number of PDU session is not counted again in 5GC. Similarly, when the UE with ongoing PDU session(s) moves from 5GC to EPC, session continuity is guaranteed from NSAC standpoint as the admission of the PDN Connection(s) to the network slice was already granted at the time of PDU Session establishment in 5GC.

If the PDN connection associated with S-NSSAI is released in EPC, the SMF+PGW-C triggers a request (i.e. decrease) to NSACF for maximum number of UEs and/or maximum number of PDU sessions per network slice control. The NSACF decreases the current number of registrations and removes the UE identity from the list of UE IDs if the PDN connection(s) associated with the S-NSSAI are all released in EPC.

NOTE 3: Network Slice Admission Control in EPC is not performed for the attachment without PDN connectivity.

If EPS counting is not required for a network slice, the Network Slice Admission Control for maximum number of UEs and/or for maximum number of PDU Sessions per network slice is performed when the UE moves from EPC to 5GC, i.e. when the UE performs mobility Registration procedure from EPC to 5GC (Network Slice Admission Control for maximum number of UEs per network slice) and/or when the PDN connections are handed over from EPC to 5GC (Network Slice Admission Control for maximum number of PDU Sessions per network slice). The SMF+PGW-C is configured with the information indicating the network slice is subject to NSAC only in 5GS. The PDN connection interworking procedure is performed as described in clause 5.15.7.1. Mobility from EPC to 5GC does not guarantee all active PDU Session(s) can be transferred to the 5GC in certain circumstances when either the current number of UE registration or the current number of PDU sessions would exceed the maximum number when the UE moves from EPC to 5GC.

NOTE 4: Given that session continuity is not guaranteed when EPS counting is not required, it is recommended for services which require the session continuity to support EPS counting.