**3GPP TSG-CT WG1 Meeting #132-eC1-216049**

**E-meeting, 11-15 October 2021**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **24.501** | **CR** | **3618** | **rev** | **1** | **Current version:** | **17.4.1** |  |
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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 | **X** | Radio Access Network |  | Core Network |  |

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| ***Title:*** | Removing the rejected S-NSSAI for the maximum number of UEs reached in case of IWK with EPC | | | | | | | | | |
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| ***Source to WG:*** | ZTE, Samsung | | | | | | | | | |
| ***Source to TSG:*** | C1 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | eNS\_Ph2 | | | | |  | ***Date:*** | | | 2021-09-28 |
|  |  | | | |  | |  | | |  |
| ***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-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | SA2 has update NSAC for interworking with EPC in subclause 5.15.11.3 of TS 23.501. It states as:  “*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.*”  Considering the scenario,  a. The UE registrates to 5GC(via 3GPP or non3GPP) and includes a S-NSSAI(S-NSSA1) in the requested NSSAI.  b. S-NSSAI1 is rejected for the maximum number of UEs reached and the timer T3526 is running. The S-NSSAI1 may be rejected via one access or both acceses.  c. The UE moves from 5GS to EPS and initiates a PDN session eatablishment procedure.  c.1 If EPS counting is required for a network slice, the SMF+PGW-C selects S-NSSAI1 associated with the PDN connection and invokes NSAC procedure. The network slice with S-NSSAI1 is not available.  c.2 if EPS counting is not required for a network slice, the SMF+PGW-C selects S-NSSAI1 associated with the PDN connection  d. The S-NSSAI1 is included in ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST message and sent to the UE.  e. when the UE moves back to 5GS and initiates a registration in case of the timer T3526 for S-NSSAI1 running, the S-NSSAI1 will not be included in requested NSSAI. Then the associcated PDU/PDN session will be released.  In order to provide service continuity, it is proposed for the UE to remove S-NSSAI1 from rejected NSSAI in step e even if the timer T3526 is running.  During inter-system mobility, the UE may register to the network via non-3GPP access or 3GPP access. Thus in order to provide service continuity, the S-NSSAI1 should be removed from the rejected NSSAI for each access, if any. | | | | | | | | |
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| ***Summary of change:*** | | Add a case to remove the S-NSSAI from the rejected NSSAI for the maximum number of UEs reached and stop the associated timer T3526 if running. | | | | | | | | |
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| ***Consequences if not approved:*** | | The service continuity cannot be guaranteed in the case above. | | | | | | | | |
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| ***Clauses affected:*** | | 4.6.2.2 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | |  | | | | | | | | |

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

#### 4.6.2.2 NSSAI storage

If available, the configured NSSAI(s) shall be stored in a non-volatile memory in the ME as specified in annex C.

The allowed NSSAI(s) should be stored in a non-volatile memory in the ME as specified in annex C.

Each of the configured NSSAI stored in the UE is a set composed of at most 16 S-NSSAIs. Each of the allowed NSSAI stored in the UE is a set composed of at most 8 S-NSSAIs and is associated with a PLMN identity or SNPN identity, an access type and, if the UE supports access to an SNPN using credentials from a credentials holder, the selected entry of the "list of subscriber data" or the selected PLMN subscription. Each of the configured NSSAI except the default configured NSSAI, and the rejected NSSAI is associated with a PLMN identity or SNPN identity and, if the UE supports access to an SNPN using credentials from a credentials holder, the selected entry of the "list of subscriber data" or the selected PLMN subscription. Each of the pending NSSAI stored in the UE is a set composed of at most 16 S-NSSAIs and is associated with a PLMN identity or SNPN identity and, if the UE supports access to an SNPN using credentials from a credentials holder, the selected entry of the "list of subscriber data" or the selected PLMN subscription. The S-NSSAI(s) in the rejected NSSAI for the current registration area are further associated with one or more tracking areas where the rejected S-NSSAI(s) is not available. The S-NSSAI(s) in the rejected NSSAI for the current PLMN or SNPN shall be considered rejected for the current PLMN or SNPN regardless of the access type. The S-NSSAI(s) in the rejected NSSAI for the failed or revoked NSSAA shall be considered rejected for the current PLMN regardless of the access type. The S-NSSAI(s) in the rejected NSSAI for the maximum number of UEs reached shall be considered rejected for the current PLMN or SNPN regardless of the access type. There shall be no duplicated PLMN identities or SNPN identities associated with each of the list of configured NSSAI(s), pending NSSAI(s), rejected NSSAI(s) for the current PLMN or SNPN, rejected NSSAI(s) for the current registration area, rejected NSSAI(s) for the failed or revoked NSSAA, and rejected NSSAI for the maximum number of UEs reached.

The UE stores NSSAIs as follows:

a) The configured NSSAI shall be stored until a new configured NSSAI is received for a given PLMN or SNPN. The network may provide to the UE the mapped S-NSSAI(s) for the new configured NSSAI which shall also be stored in the UE. When the UE is provisioned with a new configured NSSAI for a PLMN or SNPN, the UE shall:

1) replace any stored configured NSSAI for this PLMN or SNPN with the new configured NSSAI for this PLMN or SNPN;

2) delete any stored mapped S-NSSAI(s) for the configured NSSAI and, if available, store the mapped S-NSSAI(s) for the new configured NSSAI;

3) delete any stored allowed NSSAI for this PLMN or SNPN and, if available, the stored mapped S-NSSAI(s) for the allowed NSSAI, if the UE received the new configured NSSAI for this PLMN or SNPN and the Configuration update indication IE with the Registration requested bit set to "registration requested", in the same CONFIGURATION UPDATE COMMAND message but without any new allowed NSSAI for this PLMN or SNPN included;

4) delete any stored rejected NSSAI;

4A) remove from the stored mapped S-NSSAI(s) for the rejected NSSAI for the current PLMN or SNPN and the stored mapped S-NSSAI(s) for the rejected NSSAI for the current registration area and the stored rejected NSSAI for the maximum number of UEs reached, the S-NSSAI(s), if any, included in the mapped S-NSSAI(s) for the new configured NSSAI for the current PLMN or SNPN (if the UE is roaming); and

5) delete any S-NSSAI(s) stored in the pending NSSAI that are not included in the new configured NSSAI for the current PLMN or SNPN or any mapped S-NSSAI(s), if any, stored in the pending NSSAI that are not included in the mapped S-NSSAI(s) for the configured NSSAI (if the UE is roaming);

If the UE receives an S-NSSAI associated with a PLMN ID from the network during the PDN connection establishment procedure in EPS as specified in 3GPP TS 24.301 [15] or via ePDG as specified in 3GPP TS 24.302 [16], the UE may store the received S-NSSAI in the configured NSSAI for the PLMN identified by the PLMN ID associated with the S-NSSAI, if not already included in the configured NSSAI;

The UE may continue storing a received configured NSSAI for a PLMN and associated mapped S-NSSAI(s), if available, when the UE registers in another PLMN.

NOTE 1: The maximum number of configured NSSAIs and associated mapped S-NSSAIs for PLMNs other than the HPLMN that need to be stored in the UE, and how to handle the stored entries, are up to UE implementation.

b) The allowed NSSAI shall be stored until:

1) a new allowed NSSAI is received for a given PLMN or SNPN;

2) the CONFIGURATION UPDATE COMMAND message with the Registration requested bit of the Configuration update indication IE set to "registration requested" is received and contains no other parameters (see subclauses 5.4.4.2 and 5.4.4.3); or

3) the REGISTRATION ACCEPT message is received with the "NSSAA to be performed" indicator of the 5GS registration result IE set to "Network slice-specific authentication and authorization is to be performed", and the REGISTRATION ACCEPT message contains a pending NSSAI and no new allowed NSSAI as described in subclause 5.5.1.2.4 and subclause 5.5.1.3.4.

The network may provide to the UE the mapped S-NSSAI(s) for the new allowed NSSAI (see subclauses 5.5.1.2 and 5.5.1.3) which shall also be stored in the UE. When a new allowed NSSAI for a PLMN or SNPN is received, the UE shall:

1) replace any stored allowed NSSAI for this PLMN or SNPN and its equivalent PLMN(s) with the new allowed NSSAI for this PLMN or SNPN;

2) delete any stored mapped S-NSSAI(s) for the allowed NSSAI for this PLNN or SNPN and its equivalent PLMN(s) and, if available, store the mapped S-NSSAI(s) for the new allowed NSSAI;

3) remove from the stored rejected NSSAI for the current PLMN or SNPN, the rejected NSSAI for the current registration area and rejected NSSAI for the maximum number of UEs reached, the S-NSSAI(s), if any, included in the new allowed NSSAI for the current PLMN or SNPN, unless the S-NSSAI in the rejected NSSAI is associated with one or more S-NSSAI(s) in the stored mapped rejected NSSAI and these mapped S-NSSAI(s) are not included in the mapped S-NSSAI(s) for the new allowed NSSAI;

4) remove from the stored rejected NSSAI for the failed or revoked NSSAA, and stop the associated back-off timer(s), the S-NSSAI(s), if any, included in the new allowed NSSAI for the current PLMN or SNPN (if the UE is not roaming) or the mapped S-NSSAI(s) for the new allowed NSSAI for the current PLMN or SNPN (if the UE is roaming);

5) remove from the stored mapped S-NSSAI(s) for the rejected NSSAI for the current PLMN or SNPN, the stored mapped S-NSSAI(s) for the rejected NSSAI for the current registration area and rejected NSSAI for the maximum number of UEs reached, the S-NSSAI(s), if any, included in the mapped S-NSSAI(s) for the new allowed NSSAI for the current PLMN or SNPN (if the UE is roaming); and

6) remove from the stored pending NSSAI for this PLNN or SNPN and its equivalent PLMN(s), one or more S-NSSAIs, if any, included in the new allowed NSSAI for the current PLMN or SNPN and its equivalent PLMN(s) (if the UE is not roaming) or the mapped S-NSSAI(s) for the new allowed NSSAI for the current PLMN or SNPN and its equivalent PLMN(s) (if the UE is roaming).

If the UE receives the CONFIGURATION UPDATE COMMAND message with the Registration requested bit of the Configuration update indication IE set to "registration requested" and contains no other parameters (see subclauses 5.4.4.2 and 5.4.4.3), the UE shall delete any stored allowed NSSAI for this PLMN or SNPN, and delete any stored mapped S-NSSAI(s) for the allowed NSSAI, if available;

NOTE 2: Whether the UE stores the allowed NSSAI and the mapped S-NSSAI(s) for the allowed NSSAI also when the UE is switched off is implementation specific.

c) When the UE receives the S-NSSAI(s) included in the rejected NSSAI in the REGISTRATION ACCEPT message, the REGISTRATION REJECT message, the DEREGISTRATION REQUEST message or in the CONFIGURATION UPDATE COMMAND message, the UE shall:

1) store the S-NSSAI(s) into the rejected NSSAI and the mapped S-NSSAI(s) for the rejected NSSAI based on the associated rejection cause(s);

2) if the UE receives the S-NSSAI(s) included in the Rejected NSSAI IE, or if the UE receives the S-NSSAI(s) included in the Extended rejected NSSAI IE in non-roaming case, remove from the stored allowed NSSAI for the current PLMN or SNPN and its equivalent PLMN(s), the S-NSSAI(s), if any, included in the:

i) rejected NSSAI for the current PLMN or SNPN, for each and every access type;

ii) rejected NSSAI for the current registration area, associated with the same access type; or

iii) rejected NSSAI for the maximum number of UEs reached, associated with the same access type;

3) if the UE receives the S-NSSAI(s) included in the Extended rejected NSSAI IE in roaming case, remove from the stored allowed NSSAI for the current PLMN or SNPN and its equivalent PLMN(s), the S-NSSAI(s), if any, included in the:

i) rejected NSSAI for the current PLMN or SNPN, for each and every access type; or

ii) rejected NSSAI for the current registration area, associated with the same access type; and

iii) rejected NSSAI for the maximum number of UEs reached, associated with the same access type;

if the mapped S-NSSAI(s) for the S-NSSAI in the stored allowed NSSAI for the current PLMN or SNPN are stored in the UE, and the all of the mapped S-NSSAI are included in the Extended rejected NSSAI IE;

4) remove from the stored allowed NSSAI for the current PLMN or SNPN and its equivalent PLMN(s) (if the UE is not roaming) or the stored mapped S-NSSAI(s) for the allowed NSSAI (if available and if the UE is roaming), the S-NSSAI(s), if any, included in the:

i) rejected NSSAI for the failed or revoked NSSAA, for each and every access type;

ii) mapped S-NSSAI(s) for the rejected NSSAI for the current PLMN, for each and every access type; or

iii) mapped S-NSSAI(s) for the rejected NSSAI for the current registration area, associated with the same access type; and

iv) mapped S-NSSAI(s) for the rejected NSSAI for the maximum number of UEs reached, associated with the same access type;

5) if the UE receives the S-NSSAI(s) included in the Rejected NSSAI IE, or if the UE receives the S-NSSAI(s) included in the Extended rejected NSSAI IE in non-roaming case, remove from the stored pending NSSAI for the current PLMN or SNPN and its equivalent PLMN(s), the S-NSSAI(s), if any, included in the:

i) rejected NSSAI for the current PLMN or SNPN, for each and every access type;

ii) rejected NSSAI for the current registration area, associated with the same access type; or

iii) rejected NSSAI for the maximum number of UEs reached, associated with the same access type;

6) if the UE receives the S-NSSAI(s) included in the Extended rejected NSSAI IE, remove from the stored pending NSSAI for the current PLMN or SNPN and its equivalent PLMN(s), the S-NSSAI(s), if any, included in the:

i) rejected NSSAI for the current PLMN or SNPN, for each and every access type; or

ii) rejected NSSAI for the current registration area, associated with the same access type,

if the mapped S-NSSAI(s) for the S-NSSAI in the stored pending NSSAI are stored in the UE, and the all of the mapped S-NSSAI(s) are included in the Extended rejected NSSAI IE; and

7) remove from the stored pending NSSAI for the current PLMN and its equivalent PLMN(s) or SNPN (if the UE is not roaming) or the stored mapped S-NSSAI(s) for the pending NSSAI, the S-NSSAI(s) (if available and if the UE is roaming) included in the:

i) rejected NSSAI for the failed or revoked NSSAA, for each and every access type;

ii) mapped S-NSSAI(s) for the rejected NSSAI for the current PLMN, for each and every access type; or

iii) mapped S-NSSAI(s) for the rejected NSSAI for the current registration area, associated with the same access type.

When the UE:

1) enters state 5GMM-DEREGISTERED following an unsuccessful registration for 5GMM causes other than #62 "No network slices available" for the current PLMN;

2) successfully registers with a new PLMN; or

3) enters state 5GMM-DEREGISTERED following an unsuccessful registration with a new PLMN;

and the UE is not registered with the current PLMN over another access, the rejected NSSAI for the current PLMN and the rejected NSSAI for the failed or revoked NSSAA shall be deleted.

When the UE receive ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST message provided with S-NSSAI and the PLMN ID in the protocol configuration options IE or extended protocol configuration options IE (see subclause 6.2.2 of 3GPP TS 24.301 [15]), the UE shall remove the S-NSSAI from the rejected NSSAI for the current PLMN. When the UE receive ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST message provided with S-NSSAI and the PLMN ID in the protocol configuration options IE or extended protocol configuration options IE (see subclause 6.2.2 of 3GPP TS 24.301 [15]), the UE may remove the S-NSSAI from the rejected NSSAI for the maximum number of UEs reached for each and every access type, if any, and stop the timer T3526 associated with the S-NSSAI if running.

When the UE:

1) deregisters over an access type;

2) successfully registers in a new registration area over an access type; or

3) enters state 5GMM-DEREGISTERED or 5GMM-REGISTERED following an unsuccessful registration in a new registration area over an access type;

the rejected NSSAI for the current registration area corresponding to the access type shall be deleted;

d) When the UE receives the pending NSSAI in the REGISTRATION ACCEPT message, the UE shall replace any stored pending NSSAI for this PLMN or SNPN with the new pending NSSAI received in the REGISTRATION ACCEPT message for this PLMN or SNPN. If the UE does not receive the pending NSSAI in the REGISTRATION ACCEPT message and the "NSSAA to be performed" indicator is not set to "Network slice-specific authentication and authorization is to be performed" in the 5GS registration result IE of the REGISTRATION ACCEPT message, the UE shall delete the stored pending NSSAI, if any, for this PLMN or SNPN and its equivalent PLMN(s).

If the registration area contains TAIs belonging to different PLMNs, which are equivalent PLMNs, then for each of the equivalent PLMNs, the UE shall replace any stored pending NSSAI with the pending NSSAI received in the registered PLMN.

When the UE:

1) deregisters with the current PLMN using explicit signalling or enters state 5GMM-DEREGISTERED for the current PLMN;

2) successfully registers with a new PLMN;

3) enters state 5GMM-DEREGISTERED following an unsuccessful registration with a new PLMN; or

4) successfully initiates an attach or tracking area update procedure in S1 mode and the UE is operating in single-registration mode;

and the UE is not registered with the current PLMN over another access, the pending NSSAI for the current PLMN and its equivalent PLMN(s) shall be deleted;

e) When the UE receives the Network slicing indication IE with the Network slicing subscription change indication set to "Network slicing subscription changed" in the REGISTRATION ACCEPT message or in the CONFIGURATION UPDATE COMMAND message, the UE shall delete the network slicing information for each of the PLMNs or SNPNs that the UE has slicing information stored for (excluding the current PLMN or SNPN). The UE shall not delete the default configured NSSAI. Additionally, the UE shall update the network slicing information for the current PLMN or SNPN (if received) as specified above in bullets a), b), c) and d); and

f) When the UE receives the new default configured NSSAI included in the default configured NSSAI update data in the Payload container IE of DL NAS TRANSPORT message, the UE shall replace any stored default configured NSSAI with the new default configured NSSAI. In case of SNPN, the UE shall replace the stored default configured NSSAI associated with the selected entry of the "list of subscriber data" or the PLMN subscription with the new default configured NSSAI.

\*\*\*\*\* End of change \*\*\*\*\*