**3GPP TSG-CT WG1 Meeting #125-eC1-204521**

**Electronic meeting, 20-28 August 2020**

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| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **24.501** | **CR** | **2402** | **rev** | **-** | **Current version:** | **16.5.1** |  |
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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:*** | Alternative 1: UE behaviour regarding N1 mode capability upon T3247 expiry | | | | | | | | | |
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| ***Source to WG:*** | Nokia, Nokia Shanghai Bell, T-Mobile USA, InterDigital | | | | | | | | | |
| ***Source to TSG:*** | C1 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | Vertical\_LAN | | | | |  | ***Date:*** | | | 2020-07-03 |
|  |  | | | |  | |  | | |  |
| ***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 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-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
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| ***Reason for change:*** | | At CT1#122e, a list of SNPNs for which the N1 mode capability was disabled was added in TS 23.122 (see CR #502r1, C1-200847). If the UE received the NAS reject message with 5GMM cause #27 without integrity protection, it will add the SNPN ID to the list and start T3247. But currently there is no UE behaviour specified for this list when T3247 expires.  It is proposed that upon expiry of T3247, the UE re-enables its N1 mode capability and for each corresponding counter that has a value greater than zero and less than a UE implementation-specific maximum value, the UE removes the respective SNPN from the list of SNPNs for which N1 mode was disabled.  Similar change is required for 5GMM cause #72. | | | | | | | | |
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| ***Summary of change:*** | | For each access, when T3247 expires, the UE shall re-eanble the N1 mode capability and, for each corresponding counter having a value greater than zero and less than a UE implementation-specific maximum value, remove the respective SNPN from the list of SNPNs where N1 mode capability was disabled. | | | | | | | | |
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| ***Consequences if not approved:*** | | When the reject message was sent un-integrity-protected, the UE may avoid to select a certain SNPN for an unnecessarily long time. | | | | | | | | |
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| ***Clauses affected:*** | | 5.3.20.3 | | | | | | | | |
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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:*** | |  | | | | | | | | |

#### 5.3.20.3 Requirements for UE in an SNPN

If the UE is operating in SNPN access mode, the UE shall maintain, for each of the entries in the "list of subscriber data":

- one SNPN-specific attempt counter for 3GPP access, if the UE supports accessing SNPN services via a PLMN. The counter is applicable to access attempts via 3GPP access only;

- one SNPN-specific attempt counter for non-3GPP access. The counter is applicable in case of accessing SNPN services via a PLMN only;

- one counter for "the entry for the current SNPN considered invalid for 3GPP access" events, if the UE supports accessing SNPN services via a PLMN; and

- one counter for "the entry for the current SNPN considered invalid for non-3GPP access" events. The counter is applicable in case of accessing SNPN services via a PLMN only.

NOTE 1: The term "non-3GPP access" used in the counter for "SNPN-specific attempt counter for non-3GPP access" events and the counter for "the entry for the current SNPN considered invalid for non-3GPP access" events, is used to express access to SNPN services via a PLMN.

The UE shall store the above counters in its non-volatile memory. The UE shall erase the attempt counters and reset the event counters to zero when the entry of the "list of subscriber data" with the corresponding SNPN identity is updated. The counter values shall not be affected by the activation or deactivation of MICO mode or power saving mode (see 3GPP TS 24.301 [15]).

The UE implementation-specific maximum value for any of the above counters shall not be greater than 10.

NOTE 2: Different counters can use different UE implementation-specific maximum values.

If the UE receives a REGISTRATION REJECT or SERVICE REJECT message without integrity protection with 5GMM cause value #3, #6, #7, #12, #13, #15, #27, #74, or #75 before the network has established secure exchange of NAS messages for the N1 NAS signalling connection, the UE shall stop timer T3510 or T3517, if running, and start timer T3247 (see 3GPP TS 24.008 [12]) with a random value uniformly drawn from the range between:

a) 15 minutes and 30 minutes for 5GMM cause value #74; or

b) 30 minutes and 60 minutes for other 5GMM cause values;

if the timer is not running, and take the following actions:

Editor's note [WI: Vertical\_LAN, CR#1453]: It is FFS whether 5GMM cause value # 72 "Non-3GPP access to 5GCN not allowed" is impacted by the requirements captured in the clause.

a) if the 5GMM cause value received is #3, #6, or #7:

1) if the 5GMM cause value is received over 3GPP access:

i) if the UE is already registered over another access, the UE shall:

A) store the current TAI in the list of "5GS forbidden tracking areas for roaming", memorize the current TAI was stored in the list of "5GS forbidden tracking areas for roaming" for non-integrity protected NAS reject message and enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE; and

B) search for a suitable cell in another tracking area according to 3GPP TS 38.304 [28]; or

ii) otherwise if the counter for "the entry for the current SNPN considered invalid for 3GPP access" events has a value less than a UE implementation-specific maximum value, the UE shall:

A) set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete 5G-GUTI, last visited registered TAI, TAI list, and ngKSI for 3GPP access;

B) increment the counter for "the entry for the current SNPN considered invalid for 3GPP access" events;

C) reset the registration attempt counter in case of a REGISTRATION REJECT message or reset the service request attempt counter in case of a SERVICE REJECT message;

D) store the current TAI in the list of "5GS forbidden tracking areas for roaming" for the current SNPN, memorize the current TAI was stored in the list of "5GS forbidden tracking areas for roaming" for the current SNPN for non-integrity protected NAS reject message, and enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE; and

E) search for a suitable cell in another tracking area according to 3GPP TS 38.304 [28]. As a UE implementation option, if accessing SNPN services via a PLMN is available and the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is not considered invalid for non-3GPP access, then the UE may attempt to access SNPN services via a PLMN; or

iii) otherwise, the UE shall proceed as specified in subclauses 5.5.1 and 5.6.1;

2) if the 5GMM cause value is received over non-3GPP access:

NOTE 3: A 5GMM cause value "received over non-3GPP access" in this subclause refers to a 5GMM cause value received via a PLMN when the UE attempts to access SNPN services via a PLMN.

i) if the UE is already registered over another access, the UE shall enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE; or

ii) otherwise if the counter for "the entry for the current SNPN considered invalid for non-3GPP access" events has a value less than a UE implementation-specific maximum value, the UE shall:

A) set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete the 5G-GUTI, last visited registered TAI, TAI list, and ngKSI for non-3GPP access;

B) enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE; and

C) increment the counter for "the entry for the current SNPN considered invalid for non-3GPP access" events. As a UE implementation option, if 3GPP access is available and the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is not considered invalid for 3GPP access, then the UE may make a registration attempt over 3GPP access; or

iii) otherwise, the UE shall proceed as specified in subclauses 5.5.1 and 5.6.1;

b) if the 5GMM cause value received is #12, #13, or #15, the UE shall proceed as specified in subclauses 5.5.1 and 5.6.1. Additionally:

1) if the 5GMM cause value is received over 3GPP access, accessing SNPN services via a PLMN is available, the UE has not accessed SNPN services via a PLMN yet, and the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is not considered invalid for non-3GPP access, the UE may attempt to access SNPN services via a PLMN; or

2) if the 5GMM cause value is received over non-3GPP access, 3GPP access is available, the UE is not registered to the current SNPN over 3GPP access yet, and the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is not considered invalid for 3GPP access, the UE may make a registration attempt over 3GPP access;

NOTE 4: The network does not send 5GMM cause value #13 to the UE operating in SNPN access mode in this release of specification.

c) if the 5GMM cause value received is #27, the UE shall proceed as specified in subclauses 5.5.1 and 5.6.1. Additionally, if the SNPN-specific attempt counter for the respective access type and for the current SNPN has a value less than a UE implementation-specific maximum value, the UE shall increment this counter for the SNPN; and

d) if the 5GMM cause value received is #74 or #75, in addition to the UE requirements specified in subclauses 5.5.1 and 5.6.1:

1) if the message was received via 3GPP access and if the SNPN-specific attempt counter for 3GPP access for the SNPN sending the reject message has a value less than a UE implementation-specific maximum value, the UE shall increment the SNPN-specific attempt counter for 3GPP access for the SNPN; or

2) if the message was received via non-3GPP access and if the SNPN-specific attempt counter for non-3GPP access for the SNPN sending the reject message has a value less than a UE implementation-specific maximum value, the UE shall increment the SNPN-specific attempt counter for non-3GPP access for the SNPN.

NOTE 5: The message "received via non-3GPP access" in this subclause refers to a message received via a PLMN when the UE attempts to access SNPN services via a PLMN.

Upon expiry of timer T3247, the UE shall:

- remove, for each SNPN whose identity is included in the "list of subscriber data", all tracking areas from the list of "5GS forbidden tracking areas for regional provision of service" and the list of "5GS forbidden tracking areas for roaming", which were stored in these lists for non-integrity protected NAS reject message;

- set each entry of the "list of subscriber data" to valid for 3GPP access, if the corresponding counter for "the entry for the current SNPN considered invalid for 3GPP access" events has a value less than a UE implementation-specific maximum value;

- set each entry of the "list of subscriber data" to valid for non-3GPP access, if the corresponding counter for "the entry for the current SNPN considered invalid for non-3GPP access" events has a value less than a UE implementation-specific maximum value;

- remove each SNPN identity in the "list of subscriber data" from the "permanently forbidden SNPNs" list or "temporarily forbidden SNPNs" list, if the corresponding SNPN-specific attempt counter for 3GPP access has a value greater than zero and less than a UE implementation-specific maximum value and the SNPN identity is included in any of the "permanently forbidden SNPNs" list or "temporarily forbidden SNPNs" list;

- remove each SNPN identity in the "list of subscriber data" from the "permanently forbidden SNPNs" list for non-3GPP access or "temporarily forbidden SNPNs" list for non-3GPP access, if the corresponding SNPN-specific attempt counter for non-3GPP access has a value greater than zero and less than a UE implementation-specific maximum value and the SNPN identity is included in any of the "permanently forbidden SNPNs" list for non-3GPP access or "temporarily forbidden SNPNs" list for non-3GPP access;

- re-enable the N1 mode capability for 3GPP access and, for each SNPN-specific N1 mode attempt counter for 3GPP access that has a value greater than zero and less than a UE implementation-specific maximum value, remove the respective SNPN from the list of SNPNs for which the N1 mode capability was disabled due to receipt of a reject from the network with 5GMM cause #27 "N1 mode not allowed" (see 3GPP TS 23.122 [5]);

- re-enable the N1 mode capability for non-3GPP access and, for each SNPN-specific N1 mode attempt counter for non-3GPP access that has a value greater than zero and less than a UE implementation-specific maximum value, remove the respective SNPN from the list of SNPNs for which N1 mode capability was disabled for non-3GPP access due to receipt of a reject from the network with 5GMM cause #27 "N1 mode not allowed" or 5GMM cause #72 "non-3GPP access to 5GCN not allowed"; and

- initiate a registration procedure, if still needed, dependent on 5GMM state and 5GS update status, or perform SNPN selection according to 3GPP TS 23.122 [5].

When the UE is switched off:

- for each SNPN-specific attempt counter for 3GPP access having a value greater than zero and less than the UE implementation-specific maximum value, the UE shall remove the respective SNPN identity from the "permanently forbidden SNPNs" list or "temporarily forbidden SNPNs" list, if available; and

- for each SNPN-specific attempt counter for non-3GPP access having a value greater than zero and less than the UE implementation-specific maximum value, the UE shall remove the respective SNPN identity from the "permanently forbidden SNPNs" list for non-3GPP access or "temporarily forbidden SNPNs" list for non-3GPP access, if available.

When an entry of the "list of subscriber data" is updated:

- if the SNPN-specific attempt counter for 3GPP access for the SNPN corresponding to the entry has a value greater than zero and less than the UE implementation-specific maximum value, the UE shall remove the SNPN identity corresponding to the entry from the "permanently forbidden SNPNs" list or "temporarily forbidden SNPNs" list, if available; and

- if the SNPN-specific attempt counter for non-3GPP access for the SNPN corresponding to the entry has a value greater than zero and less than the UE implementation-specific maximum value, the UE shall remove the SNPN identity corresponding to the entry from the "permanently forbidden SNPNs" list for non-3GPP access or "temporarily forbidden SNPNs" list for non-3GPP access, if available.