**3GPP TSG-CT WG1 Meeting #134-eC1-22xxxx**

**E-meeting, 17-25 February 2022**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **23.122** | **CR** | **0823** | **rev** | **9** | **Current version:** | **17.5.0** |  |
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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:*** | Limited service state over satellite NG-RAN | | | | | | | | | |
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| ***Source to WG:*** | Nokia, Nokia Shanghai Bell, Apple | | | | | | | | | |
| ***Source to TSG:*** | C1 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | 5GSAT\_ARCH-CT | | | | |  | ***Date:*** | | | 2022-02-19 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***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)* | |
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| ***Reason for change:*** | | CT1 made the following agreement.  *For this Key issue, SA1 provided a guidance by SA1 LS reply (S1-211319) as follows:*  *The UE should first determine a most suitable PLMN based on its own physical location determination. As there may be border cases where the UE cannot determine sufficiently accurate or sufficiently precise in which country it is, the UE may also still attempt to obtain (emergency) services from a PLMN that according to the UE is not allowed to operate in the country of the UE's location. If the PLMN indicates it is not allowed to operate in the country of the UE’s location, the UE should not (re)-attempt emergency calls.*  *Based on the above requirements, the following conclusions are adopted:*  *- If a PLMN indicates it is not allowed to operate in the country of the UE’s location, the UE should not (re)-attempt emergency calls in that PLMN.*  *- Otherwise, if the UE is unable to obtain normal services from any PLMN, the UE may attempt to obtain emergency services from any available PLMN.*  The agreement should be implemented in the TS. | | | | | | | | |
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| ***Summary of change:*** | | It is clarified that, if a UE received 5GMM cause value #78, the UE in the limited service state cannot camp on any PLMN but should camp on a PLMN allowed to operate at the present MS location. | | | | | | | | |
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| ***Consequences if not approved:*** | | The CT1 agreement cannot be fulfilled. | | | | | | | | |
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| ***Clauses affected:*** | | 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's revision history:*** | |  | | | | | | | | |

## 3.5 No suitable cell (limited service state)

There are a number of situations in which the MS is unable to obtain normal service from a PLMN or SNPN. These include:

a) Failure to find a suitable cell of the selected PLMN or of the selected SNPN;

b) No SIM in the MS or the "list of subscriber data" with no valid entry;

c) A "PLMN not allowed", "Requested service option not authorized in this PLMN" or "Serving network not authorized" response in case of PLMN or a "Temporarily not authorized for this SNPN" or "Permanently not authorized for this SNPN" response in case of SNPN when an LR is received;

d) An "illegal MS" or "illegal ME" response when an LR is received (Any SIM or the corresponding entry of the "list of subscriber data" in the ME is then considered "invalid");

e) An "IMSI unknown in HLR" response when an LR is received (Any SIM in the ME is then considered "invalid" for non-GPRS services);

f) A "GPRS services not allowed" response when an LR of a GPRS MS attached to GPRS services only is received (The cell selection state of GPRS MSs attached to GPRS and non-GPRS depends on the outcome of the location updating), or an "EPS services not allowed" response is received when an EPS attach, tracking area update or service request is performed, or a "5GS services not allowed" response is received when a registration or service request is performed;

f1) A "PLMN not allowed to operate at the present UE location" response received via satellite NG-RAN;

g) Power saving mode (PSM) is activated (see 3GPP TS 23.682 [27A]); or

h) Mobile initiated connection only (MICO) mode is activated (see 3GPP TS 23.501 [62] and 3GPP TS 23.502 [63]).

i) MS supporting CAG is camped on a CAG cell belonging to a PLMN, the CAG-ID of the CAG cell is not manually selected by the user and none of the CAG-ID(s) of the CAG cell are present in the "Allowed CAG list" associated with that PLMN in the "CAG information list";

j) MS supporting CAG is camped on a non-CAG cell belonging to a PLMN, the PLMN ID of the non-CAG cell without a CAG-ID is not manually selected by the user and the UE is configured with "indication that the MS is only allowed to access 5GS via CAG cells" for that PLMN in the "CAG information list"; and

k) MS supporting CAG is camped on a CAG cell belonging to a PLMN, the CAG-ID of the CAG cell is not manually selected by the user and the "CAG information list" does not contain an entry for the PLMN (e.g. because the UE is not (pre-)configured with a "CAG information list").

(In automatic PLMN selection mode, items a, c, f, and f1 would normally cause a new PLMN selection, but even in this case, the situation may arise when no PLMNs are available and allowable for use).

(In automatic SNPN selection mode, items a, c, d, and f would normally cause a new SNPN selection if there are two or more entries in the "list of subscriber data", but even in this case, the situation may arise when no SNPNs are available and allowable for use).

For the items a to f1, if the MS does not operate in SNPN access mode, the MS attempts to camp on an acceptable cell, irrespective of its PLMN identity, so that emergency calls or access to RLOS can be made if necessary, with the exception that:

- an MS operating in NB-S1 mode, shall never attempt to make emergency calls or to access RLOS; or

- an MS should not attempt to make emergency calls, if an attempt for an Emergency Call was rejected with cause "PLMN not allowed to operate at the present UE location" within the last 120 seconds in a PLMN via satellite NG-RAN access technology which has an entry in the list of "PLMNs not allowed to operate at the present UE location", if:

1) the current MS location is known, a geographical location is stored for the entry of this PLMN, and the distance to the current MS location is smaller than an MS implementation specific value from that stored geographical location; or

2) the timer associated with the entry of this PLMN is running and:

a) a geographical location is not stored for the entry of this PLMN; or

b) the current MS location is not known.

When in the limited service state with a valid SIM, the MS shall search for available and allowable PLMNs in the manner described in clause 4.4.3.1 and when indicated in the SIM also as described in clause 4.4.3.4. For an MS that is not in eCall only mode, with the exception of performing GPRS attach or EPS attach for emergency bearer services, performing an initial registration for emergency services, or performing EPS attach for access to RLOS, no LR requests are made until a valid SIM is present and either a suitable cell is found or a manual network reselection is performed. For an MS in eCall only mode, no LR requests are made except for performing EPS attach for emergency bearer services or an initial registration for emergency services. When performing GPRS attach or EPS attach for emergency bearer services, an initial registration for emergency services, or performing EPS attach for access to RLOS, the PLMN of the current serving cell is considered as the selected PLMN for the duration the MS is attached for emergency bearer services, registered for emergency services, or attached for access to RLOS. In the limited service state the presence of the MS need not be known to the PLMN on whose cell it has camped.

For the items a, c, d and f, if the MS operates in SNPN access mode and the MS has a valid entry in the "list of subscriber data", the MS shall search for available and allowable SNPNs in the manner described in clause 4.9.3.1. For the item b, if the MS operates in SNPN access mode, the MS:

- attempts to camp on an acceptable cell so that emergency calls can be made if supported and necessary; and

- may perform SNPN selection procedure for onboarding services in SNPN if the MS is configured with the default UE credentials.

When in the limited service state, with the exception of performing an initial registration for emergency services, no LR requests are made until a valid entry of the "list of subscriber data" is present and either a suitable cell is found or a manual network reselection is performed. In the limited service state, the presence of the MS need not be known to the SNPN on whose cell it has camped. If the MS needs to make an emergency call, the MS supports accessing a PLMN, and there is no available SNPN supporting emergency services, the MS shall stop operating in SNPN access mode and attempt to camp on a cell of a PLMN so that emergency calls can be made. After an emergency call is released, the MS may re-start operating in SNPN access mode and perform SNPN selection.

Editor's note: It is FFS whether all acceptable cells in SNPN support emergency calls.

There are also other conditions under which only emergency calls or access to RLOS may be made if the MS does not operate in SNPN access mode. These are shown in table 2 in clause 5. ProSe communications can be initiated if necessary (see 3GPP TS 24.334 [51] or 3GPP TS 24.554 [80]) when in the limited service state due to items a) or c) or f). V2X communication over PC5 can be initiated if necessary (see 3GPP TS 24.386 [59] or 3GPP TS 24.587 [75]) when in the limited service state due to items a) or c) or f).