**3GPP TSG-CT WG1 Meeting #130-eC1-21xxxx**

**Electronic meeting, 20-28 May 2021**

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
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|  | **23.122** | **CR** | **0703** | **rev** | **5** | **Current version:** | **17.2.0** |  |
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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:***  | Emergency registration to an SNPN by a UE in the limited service state or no SIM state |
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| ***Source to WG:*** | Nokia, Nokia Shanghai Bell, Ericsson |
| ***Source to TSG:*** | C1 |
|  |  |
| ***Work item code:*** | eNPN |  | ***Date:*** | 2021-05-25 |
|  |  |  |  |  |
| ***Category:*** | **C** |  | ***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:*** | CR 2649 to TS 23.501 introduces changes in TS 23.501 for support of Emergency Services for SNPNs based on the conclusions of Key Issue #3 in TR 23.700-07.Furthermore, the CR adds the following requirements to a UE in the limited service state:*For Emergency Services over NR via SNPN, the UEs in limited service state determine that the cell supports Emergency Services over NR from a broadcast indicator in AS and indication that the SNPN supports Emergency Services.**If the UE is in limited service state and unable to find a suitable cell of any available and allowable SNPN, the UE shall attempt to camp on an acceptable cell of any available SNPN supporting emergency calls (irrespective of SNPN ID or GIN) or on any available PLMN supporting emergency calls (irrespective of PLMN ID).* |
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| ***Summary of change:*** | A UE in the limited service state or no SIM state should be allowed to an initial registration for emergency services towards an SNPN. |
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| ***Consequences if not approved:*** | A UE in the limited service state or no SIM state is not able to use emergency services even if an SNPN can provide emergency services. |
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| ***Clauses affected:*** | 2, 3.5, 4.9.3.1.2, 4.9.4 |
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|  | **Y** | **N** |  |  |
| ***Other specs*** | **X** |  |  Other core specifications  | TS 23.501 CR 2649;TS 23.167 CR 0360 |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** | **Additional changes requested after CT1#129-e:**1. It was agreed that a PLMN subscription can be used for SNPN selection. Therefore, a UE in “No SIM” state should avoid using not only the “list of subscriber data” but only the PLMN subscription. See clause 4.9.4.
2. SA2 agreed the following new requirements:

 *If broadcast indicators indicate that one or more SNPNs and/or PLMNs support emergency services, then the UE initiates emergency services to either a SNPN or a PLMN according to UE implementation.**If the UE is in limited service state, the UE shall attempt to camp on an acceptable cell of any available SNPN supporting emergency calls (irrespective of SNPN ID or GIN) or on any available PLMN supporting emergency calls (irrespective of PLMN ID).*One simple solution to fulfil this requirement is to let a UE leave the SNPN access mode if no available SNPNs support emergency services. See clauses 3.5 and 4.9.4. |

# 2 General description of idle mode

When an MS is switched on, it attempts to make contact with a public land mobile network (PLMN) or stand-alone non-public network (SNPN). The particular PLMN or SNPN to be contacted may be selected either automatically or manually.

The MS looks for a suitable cell of the chosen PLMN or SNPN and chooses that cell to provide available services, and tunes to its control channel. This choosing is known as "camping on the cell". The MS will then register its presence in the registration area of the chosen cell if necessary, by means of a location registration (LR), GPRS attach, IMSI attach or registration procedure.

If the MS loses coverage of a cell, or find a more suitable cell, it reselects onto the most suitable cell of the selected PLMN or SNPN and camps on that cell. If the new cell is in a different registration area, an LR request is performed.

If the MS loses coverage of a PLMN or SNPN, either a new PLMN or SNPN is selected automatically, or an indication of which PLMNs or SNPNs are available is given to the user, so that a manual selection can be made.

Registration is not performed by MSs only capable of services that need no registration.

The purpose of camping on a cell in idle mode is fourfold:

a) It enables the MS to receive system information from the PLMN or SNPN.

b) If the MS wishes to initiate a call, it can do this by initially accessing the network on the control channel of the cell on which it is camped.

c) If the PLMN or SNPN receives a call for the MS, it knows (in most cases) the registration area of the cell in which the MS is camped. It can then send a "paging" message for the MS on control channels of all the cells in the registration area. The MS will then receive the paging message because it is tuned to the control channel of a cell in that registration area, and the MS can respond on that control channel.

d) It enables the MS to receive cell broadcast messages.

If the MS is unable to find a suitable cell to camp on, or the SIM is not inserted, or there is no valid entry in "list of subscriber data" in case the MS is operating in SNPN access mode, or if it receives certain responses to an LR request (e.g., "illegal MS"), it attempts to camp on a cell irrespective of the PLMN identity or the SNPN identity, and enters a "limited service" state in which it can only attempt to make emergency calls or to access RLOS. An MS operating in NB-S1 mode, never attempts to make emergency calls or to access RLOS. An MS operating in N1 mode never attempts to access RLOS.

If the MS is in eCall only mode, it attempts to camp on a suitable cell and enters an "eCall inactive" state in which it can only attempt an eCall over IMS, or a call to a non-emergency MSISDN or URI for test or terminal reconfiguration services as specified in 3GPP TS 31.102 [40].

If the MS is in eCall only mode and is unable to find a suitable cell to camp on, it attempts to camp on an acceptable cell in limited service state, and enters an "eCall inactive" state in which it can only attempt an eCall over IMS.

While in eCall inactive state, the MS does not perform LR with the PLMN of the cell on which the MS is camped.

In A/Gb mode, if the CTS MS is in CTS mode only or in automatic mode with CTS preferred, it will start by attempting to find a CTS fixed part on which it is enrolled.

The idle mode tasks can be subdivided into the following processes:

- PLMN selection;

- SNPN selection (N1 mode only);

- CSG selection (Iu mode and S1 mode only);

- Cell selection and reselection;

- Location registration;

- CTS fixed part selection (A/Gb mode only); and

- CAG selection (N1 mode only).

In A/Gb mode, to make this initial CTS fixed part selection, the MS shall be enrolled on at least one fixed part.

Except for SNPN selection, the relationship between these processes is illustrated in figure 1 in clause 5. The states and state transitions within each process are shown in figure 2a, figure 2b, and figure 3 in clause 5.

\*\*\*\*\* Next change \*\*\*\*\*

## 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;

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 and f 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 f, 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. When in the limited service state with a valid SIM, the MS shall search for available and allowable PLMNs in the manner described in subclause 4.4.3.1 and when indicated in the SIM also as described in subclause 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 subclause 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. 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.

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 direct communication and ProSe direct discovery for public safety use can be initiated if necessary (see 3GPP TS 24.334 [51]) 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]) when in the limited service state due to items a) or c) or f).

\*\*\*\*\* Next change \*\*\*\*\*

##### 4.9.3.1.2 Manual SNPN selection mode procedure

The MS indicates to the user one or more SNPNs, which are available and each of them is identified by an SNPN identity in an entry of the "list of subscriber data" in the ME. This includes SNPNs in the list of "permanently forbidden SNPNs", and the list of "temporarily forbidden SNPNs". The MS may indicate to the user whether the available SNPNs are present in the list of "temporarily forbidden SNPNs" or the list of "permanently forbidden SNPNs". The order in which those SNPNs are indicated is MS implementation specific.

For each of the SNPNs indicated to the user, the UE shall forward a human-readable network name along with the SNPN identity to the upper layers if the system information broadcasted for the SNPN includes the human-readable network name for the SNPN.

The MS shall limit its search for the SNPN to the NG-RAN access technology.

The user may select an SNPN and the MS then initiates registration on this SNPN using the NG-RAN access technology, the subscriber identifier and the credentials from an entry of the "list of subscriber data", with the SNPN identity matching the selected SNPN (this may take place at any time during the presentation of SNPNs).

Once the MS has registered on an SNPN selected by the user, the MS shall not automatically register on a different SNPN unless the user selects automatic SNPN selection mode.

If the user does not select an SNPN, the selected SNPN shall be the one that was selected either automatically or manually before the SNPN selection procedure started. If no such SNPN was selected or that SNPN is no longer available, then the MS shall attempt to camp on any acceptable cell and enter the limited service state.

\*\*\*\*\* Next change \*\*\*\*\*

### 4.9.4 Abnormal cases

If:

a) the "list of subscriber data" is empty; or

b) for each entry of the "list of subscriber data", such that an SNPN with the SNPN identity of the entry is available:

i) there has been an authentication failure for the subscriber identifier of the entry on the SNPN; or

ii) the MS has received an "illegal ME" or "illegal UE" response to an LR request for the subscriber identifier of entry on the SNPN;

then effectively there is no selected SNPN ("No SIM" state). In these cases, the states of the cell selection process are such that the "list of subscriber data" (if any) or the PLMN subscription (if any) is not used. Except when performing an initial registration for emergency services to an SNPN, no further attempts at registration on any SNPN are made until the MS is switched off and on again, or an entry of the "list of subscriber data" with the SNPN identity of the SNPN is updated or the USIM is inserted. When performing an initial registration for emergency services, the SNPN of the current serving cell is temporarily considered as the selected SNPN. 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.

Editor's note: Before the MS performs an initial registration for emergency services to an SNPN, it is FFS whether additional information is needed in the MS to determine that the SNPN supports emergency services.

When in automatic SNPN selection mode and the MS is in the "not updated" state with one or more suitable cells to camp on; then after the maximum allowed unsuccessful LR requests (controlled by the specific attempt counters) the MS may continue (or start if it is not running) the user reselection procedure in subclause 4.9.3.2 1.