**3GPP TSG-CT WG1 Meeting #124-eC1-20aabb**

**Electronic meeting, 02-10 June 2020 was C1-203395**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
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|  | **23.122** | **CR** | **0544** | **rev** | **1** | **Current version:** | **16.5.0** |  |
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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:***  | Clarification of cause #35 in limited service state |
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| ***Source to WG:*** | MediaTek Inc. |
| ***Source to TSG:*** | C1 |
|  |  |
| ***Work item code:*** | TEI16 |  | ***Date:*** | 2020-06-09 |
|  |  |  |  |  |
| ***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 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-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:*** | As per TS24.301, cause #35 (Requested service option not authorized in this PLMN) is treated same as cause #11 (PLMN NOT ALLOWED).As per TS24.501, cause #73 (Serving network not authorized) is treated same as cause #11 (PLMN NOT ALLOWED).1. There is need to add handling for cause #35 and #73 in current specification similar to cause #11.
2. There are many causes from TS24.301 and TS24.501 which are not covered in subclause 4.3.3 which need to be covered.
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| ***Summary of change:*** | 1. replace “registration” to “an initial registration”
2. add handling of cause #35 in section 3.5 and 4.3.3.
3. Add handling of cause #73 in section
4. Add the reference for TS24.301 and TS24.501 to handle more causes in subclause 4.3.3
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| ***Consequences if not approved:*** | Inconsistency in current specification may lead to ambigous result. |
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| ***Clauses affected:*** | 3.5, 4.3.3, 4.4.4 |
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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 ...  |
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| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** | Rev #2:Add handling for cause #73. |

## 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"; and

j) MS supporting CAG is camped on a non-CAG cell belonging to a PLMN, the non-CAG cell 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".

Editor's note: FFS whether there is any requirement for MS not supporting CAG, but supporting this release of the specification can camp on a CAG cell when no other non-CAG cells are available and the CAG cell is available for emergency services. Details of camping on such a CAG cell and availability of the CAG-cell for emergency services is subject to RAN2 agreement.

(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 UE 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. When in the limited service state, 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.

There are also other conditions under which only emergency calls or access to RLOS may be made. 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 \* \* \* \*

4.3.3 List of states for location registration (figure 3)

The states are entered depending on responses to location registration (LR) requests. Independent update states exist for GPRS and for non-GPRS operation in MSs capable of GPRS and non-GPRS services.

L0 Null – The MS is considered in this state when switched off.

L1 Updated ‑ The MS enters this state if an LR request is accepted. The update status is set to "UPDATED". The GPRS and the non-GPRS update state of a MS may enter "Updated" as a result of combined signalling or as a result of individual signalling depending on the capabilities of the network.

L2 Idle, No IMSI ‑ The MS enters this state if an LR request is rejected with cause:

 a) IMSI unknown in HLR;

 b) illegal ME;

 c) illegal MS;

 d) GPRS services not allowed,

 e) GPRS services and non-GPRS services not allowed,

 or if there is no SIM. All update states of a MS enter this state regardless whether received by individual or combined signalling for events b) and c). Event a) has no influence on the GPRS update state. Events b) and c) result in "ROAMING NOT ALLOWED" for the GPRS and/or non-GPRS update status depending on the specific location registration procedure. Event d) results in "ROAMING NOT ALLOWED" for the GPRS update status. Event e) results in "ROAMING NOT ALLOWED" for the GPRS update status and non-GPRS update status.

 If a SIM is present, the non-GPRS update status of the SIM is set to "ROAMING NOT ALLOWED".

L3 Roaming not allowed ‑ The MS enters this state if it receives an LR reject message with the cause:

 a) PLMN not allowed;

 b) Location area not allowed;

 c) Tracking area not allowed;

 d) Roaming not allowed in this location area;

 e) Roaming not allowed in this tracking area;

 f) GPRS services not allowed in this PLMN;

 g) No suitable cells in location area;

 h) No suitable cells in tracking area;

 i) Not authorized for this CSG.

 Except from event f) all update states of the MS are set to "Roaming not allowed" regardless whether received by individual or combined signalling. Event f) results in "Roaming not allowed" for the GPRS update state only. Event f) has no influence on the non-GPRS update state. The behaviour of the MS in the roaming not allowed state is dependent on the LR reject cause as shown in table 2 in clause 5. Additionally:

- in automatic mode, "PLMN not allowed", "Roaming not allowed in this location area" and "Roaming not allowed in this tracking area" cause the Automatic Network Selection procedure of subclause 4.4.3.1.1 to be started; it is also caused by "GPRS services not allowed in this PLMN" when received by a GPRS MS operating in MS operation mode C;

- in manual mode, "PLMN not allowed" and "Roaming not allowed" cause the Manual Network Selection procedure of subclause 4.4.3.1.2 to be started; it is also caused by "GPRS services not allowed in this PLMN" when received by a GPRS MS operating in MS operation mode C.

L4 Not updated ‑ The MS enters this state if any LR failure not specified for states L2 or L3 occurs, in which cases the MS is not certain whether or not the network has received and accepted the LR attempt. The non-GPRS update status on the SIM and/or the GPRS update status are set to "NOT UPDATED" depending on the specific location registration procedure and their outcome.

L5 LR request – The MS enters this state when determining that a LR request is to be made.

L6 LR pending – The MS enters this state after having started the LR, waiting for the outcome (response message from the network).

NOTE This clause does not describe all the cases. For more details refer to 3GPP TS 24.008 [23], 3GPP TS 24.301 [23A] and 3GPP TS 24.501 [64].

\* \* \* Next Change \* \* \* \*

4.4.4 Abnormal cases

If there is no SIM in the MS, if there is an authentication failure, or if the MS receives an "IMSI unknown in HLR", "illegal ME" or "illegal MS" response to an LR request, then effectively there is no selected PLMN ("No SIM" state). In these cases, the states of the cell selection process are such that no PLMN selection information is used. Except when performing GPRS attach, EPS attach for emergency bearer services, an initial registration for emergency services, or EPS attach for access to RLOS, no further attempts at registration on any PLMN are made until the MS is switched off and on again, or a SIM is inserted. When performing GPRS attach, EPS attach for emergency bearer services, an initial registration for emergency services or EPS attach for access to RLOS, the PLMN of the current serving cell is temporarily considered as the selected PLMN.

When in Automatic Network 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 of subclause 4.4.3.2.1.

A multi mode MS that also supports 3GPP2 access technology may fall back to 3GPP2 mode if no SIM is inserted.