**3GPP TSG-CT WG1 Meeting #136-eC1-22xxx**

**E-Meeting, 12th – 20th May 2022 (was C1-223430)**

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
|  |
|  | **24.501** | **CR** | **0933** | **rev** | **1** | **Current version:** | **17.6.0** |  |
|  |
| *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 | **X** |

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| ***Title:***  | Manual Selection of a non-member CAG cell |
|  |  |
| ***Source to WG:*** | Apple |
| ***Source to TSG:*** | C1 |
|  |  |
| ***Work item code:*** | 5GProtoc17 |  | ***Date:*** | 22-05-12 |
|  |  |  |  |  |
| ***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 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:*** | With the current definitions in TS 23.122 it is explicitly allowed that a UE selects a non-CAG cell and attempts to register, even if it is configured as CAG only. However an explicit statement that clarifies that a UE is also allowed to manually select a CAG cell which is not in the "Allowed CAG list" is missing. |
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| ***Summary of change:*** | It is clarified, that for a manual selection, the UE may select and attempt to register a CAG cell even if 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". |
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| ***Consequences if not approved:*** | Unclarity whether a UE migt seelct and attempt to register a CAG cell which is not in the "Allowed CAG list". |
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| ***Clauses affected:*** | 4.4.3.1.2 |
|  |  |
|  | **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 \* \* \* \*

4.4.3.1.2 Manual Network Selection Mode Procedure

The MS indicates whether there are any PLMNs, which are available using all supported access technologies. This includes PLMNs in the "forbidden PLMNs" list, "forbidden PLMNs for GPRS service" list, PLMNs which only offer services not supported by the MS, and the list of "PLMNs not allowed to operate at the present UE location". An MS which supports GSM COMPACT shall also indicate GSM COMPACT PLMNs (which use PBCCH).

If displayed, PLMNs meeting the criteria above are presented in the following order:

i)- either the HPLMN (if the EHPLMN list is not present or is empty) or, if one or more of the EHPLMNs are available then based on an optional data field on the SIM either only the highest priority available EHPLMN is to be presented to the user or all available EHPLMNs are presented to the user in priority order. If the data field is not present on the SIM, then only the highest priority available EHPLMN is presented;

ii)- PLMN/access technology combinations contained in the " User Controlled PLMN Selector with Access Technology " data file in the SIM (in priority order);

iii)- PLMN/access technology combinations contained in the "Operator Controlled PLMN Selector with Access Technology" data file in the SIM (in priority order) or stored in the ME (in priority order);

iv)- other PLMN/access technology combinations with received high quality signal in random order;

NOTE 1: High quality signal is defined in the appropriate AS specification.

v)- other PLMN/access technology combinations in order of decreasing signal quality.

In ii and iii, an MS using a SIM without access technology information storage (i.e. the "User Controlled PLMN Selector with Access Technology" and the "Operator Controlled PLMN Selector with Access Technology" data files are not present) shall instead present the PLMNs contained in the "PLMN Selector" data file in the SIM (in priority order).

In v, requirement h) in clause 4.4.3.1.1 applies.

In i to v, requirements j), k) and l) in clause 4.4.3.1.1 apply.

In iii, requirement p) in clause  4.4.3.1.1 applies.

In GSM COMPACT, the non-support of voice services shall be indicated to the user.

The HPLMN may provide on the SIM additional information on the available PLMNs. If this information is provided, then the MS shall indicate it to the user. This information, provided as free text may include:

- preferred partner,

- roaming agreement status,

- supported services

Furthermore, the MS may indicate whether the available PLMNs are present on the EHPLMN list, the Forbidden list, the User Controlled PLMN List or the Operator Controlled PLMN List. The MS may also indicate that the PLMN is not present on any of these lists.

If:

- the MS supports MINT;

- the MS is not registered via non-3GPP access connected to 5GCN;

- the MS has detected that the RPLMN is a PLMN with disaster condition as broadcasted by an NG-RAN cell of an available PLMN(s) (see clause 4.4.3.1.1);

- only forbidden PLMN(s) are available; and

- the MS receives indication that some of the forbidden PLMN(s) provide disaster roaming to the MS(s) of the RPLMN (see clause 4.4.3.1.1),

then the MS may indicate to the user that those PLMN(s) support disaster roaming.

In i to v, if the MS supports CAG, for each PLMN/access technology combination of NG-RAN access technology, the MS shall present to the user:

a) the PLMN/access technology combination and a list of CAG-IDs composed of one or more CAG-IDs such that for each CAG-ID:

1) there is an available CAG cell which broadcasts the CAG-ID for the PLMN; and

2) the following is true:

i) there exists an entry with the PLMN ID of the PLMN in the "CAG information list" and the CAG-ID is included in the "Allowed CAG list" of the entry; or

ii) the available CAG cell broadcasting the CAG-ID for the PLMN also broadcasts that the PLMN allows a user to manually select the CAG-ID.

 For each of the presented CAG-ID, the MS may indicate to the user whether the CAG-ID is present in the "Allowed CAG list" stored in the UE; and

b) the PLMN/access technology combination without a list of CAG-IDs, if there is an available NG-RAN cell which is not a CAG cell for the PLMN. If there exists an entry for the presented PLMN in the "CAG information list" and the entry includes an "indication that the MS is only allowed to access 5GS via CAG cells", the MS may indicate to the user that the MS is only allowed to access the PLMN via CAG cells.

If the NAS receives a human-readable network name associated with a CAG-ID and a PLMN ID from the AS, the human-readable network name shall be sent along with the CAG-ID and PLMN ID to the upper layer for use in manual CAG selection.

NOTE 2: A human-readable network name can be broadcasted per CAG-ID and PLMN ID by a CAG cell.

Upon selection of a PLMN (and CAG-ID if the user selected a desired CAG-ID as well) by the user, the NAS shall provide the AS with the selected PLMN ID (and CAG-ID if the user selected a desired CAG-ID as well or an indication to select a non-CAG cell if the user did not select any CAG-ID) and the MS initiates registration on this PLMN (and on a cell which broadcasts the CAG-ID if the user selected a desired CAG-ID as well) using the access technology chosen by the user for that PLMN or using the highest priority available access technology for that PLMN, if the associated access technologies have a priority order (this may take place at any time during the presentation of PLMNs). For such a registration, the MS shall ignore the contents of the "forbidden location areas for roaming", "forbidden tracking areas for roaming", "5GS forbidden tracking areas for roaming", "forbidden location areas for regional provision of service", "forbidden tracking areas for regional provision of service", "5GS forbidden tracking areas for regional provision of service", "forbidden PLMNs for GPRS service", "PLMNs not allowed to operate at the present UE location" and "forbidden PLMNs" lists. Also for such a registration, if the NAS has provided the AS with an indication to select:

- a non-CAG cell, the MS shall ignore the "indication that the MS is only allowed to access 5GS via CAG cells", if any, in the "CAG information list" for the selected PLMN; or

- a CAG cell 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", the MS shall consider the selected CAG-ID of the selected PLMN as part of the "Allowed CAG list" for the selected PLMN for this registration attempt.

NOTE 3: It is an MS implementation option whether to indicate access technologies to the user. If the MS does display access technologies, then the access technology selected by the user is only used for initial registration on the selected PLMN. If the MS does not display access technologies, then the access technology chosen for a particular PLMN should be the highest priority available access technology for that PLMN, if the associated access technologies have a priority order, and is only used for initial registration.

If the UE has a PDU session for emergency services, a PDN connection for emergency bearer services or a PDP context for emergency bearer services, manual network selection shall not be performed.

After selection of a PLMN and CAG-ID, if the AS does not provide an indication of finding a suitable or acceptable cell belonging to the selected PLMN and which broadcasts the selected CAG-ID for the registration procedure (see 3GPP TS 38.304 [40]), then:

i) the MS shall indicate to user that it can not find the selected PLMN and CAG-ID; and

ii) If there is an "indication that the MS is only allowed to access 5GS via CAG cells" in the "CAG information list" for the selected PLMN, the MS may attempt to camp on a suitable CAG cell broadcasting a CAG-ID present in the "Allowed CAG list" for the selected PLMN or an acceptable cell, otherwise the MS may attempt to camp on a suitable cell belonging to the selected PLMN (i.e. a non-CAG cell or a CAG cell broadcasting a CAG-ID present in the "Allowed CAG list" for the selected PLMN) or an acceptable cell.

Once the MS has registered on a PLMN selected by the user, the MS shall not automatically register on a different PLMN unless:

i) the new PLMN is declared as an equivalent PLMN by the registered PLMN. If the MS is registered for disaster roaming services, the UE shall also detect that the new PLMN offers disaster roaming services to the determined PLMN with disaster condition as broadcasted by the NG-RAN cell of the new PLMN (see clause 4.4.3.1.1) and that the PLMN with disaster condition determined by the UE in the old PLMN is also a PLMN with disaster condition in the new PLMN;

ii) the user selects automatic mode;

iii) the user initiates an emergency call while the MS is in limited service state and either the network does not broadcast the indication of support of emergency calls in limited service state, the registration request for emergency services is rejected by the network or the attach request for emergency bearer services is rejected by the network; or

iv) the user initiates access to RLOS, while the MS is in limited service state and either the network does not broadcast the indication of support of RLOS in limited service state, or the EPS attach request for access to RLOS is rejected by the network, or the EPS tracking area update request for access to RLOS is rejected by the network.

NOTE 4: If case iii) or iv) occurs, the MS can provide an indication to the upper layers that the MS has exited manual network selection mode.

Once the MS has registered on a PLMN selected by the user, the MS may automatically register on a different PLMN if:

1) the MS supports MINT;

2) the "list of PLMN(s) to be used in disaster condition" is non-empty;

3) there is no available PLMN which is declared as an equivalent PLMN by the RPLMN; and

4) the RPLMN of the MS is considered as the PLMN with disaster condition.

NOTE 5: If the above case occurs, the MS can provide an indication to the upper layers that the MS has exited manual network selection mode.

Editor's note: It is FFS how the MS determines whether the RPLMN has a disaster condition when in manual network selection mode.

If the user does not select a PLMN (or PLMN and CAG-ID), the selected PLMN shall be the one that was selected before the PLMN selection procedure started. If no such PLMN was selected or that PLMN is no longer available, then the MS shall attempt to camp on any acceptable cell and enter the limited service state.

If:

- the MS supports access to RLOS;

- either the UICC containing the USIM is not present in the MS, or the UICC containing the USIM is present in the MS and the MCC part of the IMSI in the USIM is present in the RLOS allowed MCC list configured in the USIM (see 3GPP TS 31.102 [40]) or in the ME (see 3GPP TS 24.368 [50]);

- one or more PLMNs offering access to RLOS has been found;

- registration cannot be achieved on any PLMN; and

- the MS is in limited service state,

the MS indicates the PLMNs offering access to RLOS, presented in the following order:

i) PLMNs contained in the RLOS preferred PLMN list configured in the USIM (see 3GPP TS 31.102 [40]) or in the ME (see 3GPP TS 24.368 [50]) (in priority order) if the MCC part of the preferred PLMN ID is present in the RLOS allowed MCC list configured in the USIM (see 3GPP TS 31.102 [40]) or in the ME (see 3GPP TS 24.368 [50]); and

ii) any of the remaining PLMNs offering access to RLOS that are not in the RLOS preferred PLMN list if the MCC part of the PLMN ID is present in the RLOS allowed MCC list configured in the USIM (see 3GPP TS 31.102 [40]) or in the ME (see 3GPP TS 24.368 [50]).

Upon selection of a PLMN by the user, the MS initiates registration for access to RLOS on the PLMN chosen by the user (this may take place at any time during the presentation of PLMNs).

\* \* \* Next section for information only \* \* \* \*

## 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 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. If the MS is enabled for SNPN, the MS needs to make an emergency call, there is no available PLMN supporting emergency services and the MS determines that there is an available SNPN supporting emergency services (based on broadcasted information of SNPN support for emergency services), the MS may start operating in SNPN access mode and attempt to camp on a cell of the SNPN supporting emergency services. After an emergency call is released, the MS should stop operating in SNPN access mode and perform PLMN selection.

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.

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).

\* \* \* End of Changes \* \* \* \*