**3GPP TSG-CT WG1 Meeting #125-eC1-20wxyz**

**Electronic meeting, 20-28 August 2020 Revision of C1-204723**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
|  |
|  | **23.122** | **CR** | **0562** | **rev** | **1** | **Current version:** | **16.6.1** |  |
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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:***  | The requirement for UE supporting CAG but without "CAG information list" in automatic network selection mode |
|  |  |
| ***Source to WG:*** | China Mobile |
| ***Source to TSG:*** | C1 |
|  |  |
| ***Work item code:*** | TEI17 |  | ***Date:*** | 2020-08-26 |
|  |  |  |  |  |
| ***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-12 (Release 12)**Rel-13 (Release 13)Rel-14 (Release 14)Rel-15 (Release 15)Rel-16 (Release 16)Rel-17 (Release 17)* |
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| ***Reason for change:*** | Due to the following limitations,there is a deployment demand to enable a UE supporting CAG but without CAG information list to access a CAG-only cell in automatic network selection mode: 1. The special industrial terminals cannot be pre-configured with CAG information list when leaving factory.(It’s an operator dependent information.)
2. They cannot be moved to a non CAG-only cell to get CAG information list.( Due to transportation, such as heavy machinery; or privacy, such as machine-only zones are not permitted to deploy non CAG-only cell.
3. These terminals arrive in batches irregularly.The dates are business sensitive information.The customers disagree to notify the operator to do the configuration for every purchase.
4. Manual operation(such as manual selection mode) are looked as unsafe factor by customers.

According to current version of TS 23.122, a UE supporting CAG but not (pre-)configured with a "CAG information list" cannot access a CAG-only cell of a PLMN to get its CAG information list due to limited service state.It is suggested to introduce “CAG-only access mode” for UE supporting CAG.Operating in CAG-only access mode, a CAG enable UE follows the rules:1. Should only access 5GS via CAG cells;
2. If not (pre-)configured with a "CAG information list", the CAG-only access mode is activated, and can consider a PLMN indicated by an NG-RAN CAG-only cell;
3. If (pre-)configured with a "CAG information list", the CAG-only access mode is deactivated, and should select a CAG cell according to the "CAG information list".

Consider the impact of unwanted unauthorized access attempts,CAG-only access mode”is limited to only access a CAG cell in HPLMN , default OFF and being switched ON is suggested. |
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| ***Summary of change:*** | * Introduce “CAG-only access mode” for the UE supporting CAG but not not (pre-)configured with a "CAG information list".
* Add the definition for “CAG-only access mode”.
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| ***Consequences if not approved:*** | The current version has no solution for the deployment demand. |
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| ***Clauses affected:*** | 1.2, 4.4.3.1.1 |
|  |  |
|  | **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:*** | Specify that “CAG-only access mode”is limited to only access a CAG cell in HPLMN.Specify that default OFF and being switched ON is suggested. |

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## 1.2 Definitions and abbreviations

For the purposes of the present document, the abbreviations defined in 3GPP TR 21.905 [36] apply.

**(A/Gb mode only):** Indicates this clause applies only to a GSM system which operates in A/Gb mode. For multi system case this is determined by the current serving radio access network.

**(Iu mode only):** Indicates this clause applies only to UMTS. For multi system case this is determined by the current serving radio access network.

NOTE 1: In accordance with the description of packet services in Iu mode in 3GPPS TS 24.008 [23], the terms 'CS/PS mode of operation' and 'PS mode of operation' are not used in the present document. Instead the terms 'MS operation mode A' and 'MS operation mode C' are used.

**(S1 mode only):** Indicates this clause applies only to an EPS. For multi system case this is determined by the current serving radio access network.

**Acceptable Cell:** This is a cell that the MS may camp on to make emergency calls or to access RLOS. It must satisfy criteria which are defined for A/Gb mode in 3GPP TS 43.022 [35], for Iu mode in 3GPP TS 25.304 [32], for S1 mode in 3GPP TS 36.304 [43], and for NR access in N1 mode in 3GPP TS 38.304 [61] and for E-UTRA access in N1 mode in 3GPP TS 36.304 [43]. For an MS in eCall only mode, an acceptable cell must further satisfy the criteria defined in subclause 4.4.3.1.1.

**Access Technology:** The access technology associated with a PLMN or SNPN. The MS uses this information to determine what type(s) of radio carrier to search for when attempting to select a specific PLMN or SNPN (e.g., GSM, UTRAN, GSM COMPACT, E-UTRAN or NG-RAN). A PLMN may support more than one access technology. SNPNs only support NG-RAN.

NOTE 2: Access technology "E-UTRAN" maps to core network type "EPC" and access technology "NG-RAN" maps to core network type "5GCN", see 3GPP TS 24.501 [64].

**ACDC:** Application specific Congestion control for Data Communication, see 3GPP TS 22.011 [9].

**Allowable PLMN:** In the case of an MS operating in MS operation mode A or B, this is a PLMN which is not in the list of "forbidden PLMNs" in the MS. In the case of an MS operating in MS operation mode C or an MS not supporting A/Gb mode and not supporting Iu mode, this is a PLMN which is not in the list of "forbidden PLMNs" and not in the list of "forbidden PLMNs for GPRS service" in the MS.

**Allowable SNPN:** In the case of an MS operating in SNPN access mode, this is an SNPN which is not in the list of "permanently forbidden SNPNs" and is not in the list of "temporarily forbidden SNPNs".

**Allowable PLMN/access technology** **combination:** For an MS operating in MS operation mode C or an MS not supporting A/Gb mode and not supporting Iu mode, this is an allowable PLMN in any specific access technology. For an MS operating in MS operation mode A or B, this is a PLMN/access technology combination where:

- the PLMN is an allowable PLMN and the specific access technology is supporting non-GPRS services; or

- the PLMN is not in the list of "forbidden PLMNs" and not in the list of "forbidden PLMNs for GPRS service" in the MS and the specific access technology is only supporting GPRS services.

EXAMPLE: E-UTRAN and NG-RAN are access technologies that are only supporting GPRS services.

**Available PLMN:** For GERAN A/Gb mode see 3GPP TS 43.022 [35]. For UTRAN see 3GPP TS 25.304 [32]. For E-UTRAN see 3GPP TS 36.304 [43]. For NG-RAN see 3GPP TS 36.304 [43] and 3GPP TS 38.304 [61]. For cdma2000® 1xRTT and cdma2000® HRPD see 3GPP2 C.S0016 [44].

**Available SNPN:** For NG-RAN see 3GPP TS 38.304 [61].

**Available PLMN/access technology** **combination:** This is an available PLMN in a specific access technology.

CAG-only access mode: A CAG enable UE operating in CAG-only access mode is only allowed to access 5GS via CAG cells.

Operating in CAG-only access mode, a CAG enable UE follows the rules:

1. Should only access 5GS via CAG cells of HPLMN or EHPLMN;
2. If not configured with a "CAG information list", the CAG-only access mode is activated, and can consider a PLMN indicated by an NG-RAN CAG-only cell;
3. If configured with a "CAG information list", the CAG-only access mode is deactivated, and should select a CAG cell according to the "CAG information list".

"CAG-only access mode" is default OFF. It can be switched ON according to the USIM by an indication (e.g. "CAG-only access mode allowed" or "CAG-only access mode ON".);

**Camped on a cell:** The MS (ME if there is no SIM) has completed the cell selection/reselection process and has chosen a cell from which it plans to receive all available services. Note that the services may be limited, and that the PLMN or the SNPN may not be aware of the existence of the MS (ME) within the chosen cell.

**Country:** A country is identified by a single MCC value, with the exception that MCC values 310 through 316 identify a single country (USA) and MCC values 404 through 406 identify a single country (India).

**CSG whitelist:** See 3GPP TS 36.304 [43].

**Current serving cell:** This is the cell on which the MS is camped.

**CTS MS:** An MS capable of CTS services is a CTS MS.

**EAB:** Extended Access Barring, see 3GPP TS 22.011 [9].

**Extended Coverage in GSM for Internet of Things (EC-GSM-IoT):** Extended coverage in GSM for IoT is a feature which enables extended coverage operation. See 3GPP TS 43.064 [55].

**EHPLMN:** Any of the PLMN entries contained in the Equivalent HPLMN list.

**Equivalent HPLMN list:** To allow provision for multiple HPLMN codes, PLMN codes that are present within this list shall replace the HPLMN code derived from the IMSI for PLMN selection purposes. This list is stored on the USIM and is known as the EHPLMN list. The EHPLMN list may also contain the HPLMN code derived from the IMSI. If the HPLMN code derived from the IMSI is not present in the EHPLMN list then it shall be treated as a Visited PLMN for PLMN selection purposes.

**Generic Access Network (GAN):** See 3GPP TS 43.318 [35A].

**GAN mode:** See 3GPP TS 43.318 [35A].

**GPRS MS:** An MS capable of GPRS services is a GPRS MS.

**MS operation mode:** See 3GPP TS 23.060 [27].

**High quality signal:** The high quality signal limit is used in the PLMN selection procedure. It is defined in the appropriate AS specification: 3GPP TS 43.022 [35] for the GSM radio access technology, 3GPP TS 25.304 [32] for the UMTS radio access technology (FDD or TDD mode), 3GPP TS 36.304 [43] for the E‑UTRAN radio access technology (WB-S1 mode, NB-S1 mode, WB-N1 mode or NB-N1 mode), 3GPP TS 36.304 [43] and and 3GPP TS 38.304 [61] for the NG-RAN radio access technology. For 3GPP2 access technologies the high quality signal limit is defined in 3GPP2 C.S0011 [45] for cdma2000® 1xRTT and in 3GPP2 C.S0033 [46] for cdma2000® HRPD. A mobile station attempting to find a cell that supports EC-GSM-IoT (see 3GPP TS 43.064 [55]) does not use high quality signal limit in the PLMN selection procedure, i.e. for the purpose of PLMN selection, when attempting to find a cell that supports EC-GSM-IoT, any found cell supporting EC-GSM-IoT is considered to be received with high quality signal. A UE attempting to find a cell that supports enhanced coverage when operating in any WB-S1 or WB-N1 enhanced coverage mode does not use high quality signal limit in the PLMN selection procedure, i.e. for the purpose of PLMN selection, when attempting to find a cell that supports enhanced coverage, any found cell supporting enhanced coverage and satisfying the coverage specific quality signal limit defined for CE mode (see 3GPP TS 36.304 [43]) is considered to be received with high quality signal.

**Home PLMN:** This is a PLMN where the MCC and MNC of the PLMN identity match the MCC and MNC of the IMSI. Matching criteria are defined in Annex A.

**In A/Gb mode,...:** Indicates this clause applies only to a GSM system which operates in A/Gb mode. For multi system case this is determined by the current serving radio access network.

**In Iu mode,...:** Indicates this clause applies only to UMTS. For multi system case this is determined by the current serving radio access network.

**In N1 mode,...:** Indicates this clause applies only to an 5GS. For multi system case this is determined by the current serving radio access network.

**In NB-N1 mode:** Indicates this paragraph applies only to a system which operates in NB-N1 mode. For a multi-access system this case applies if the current serving radio access network provides access to 5G network services via E-UTRA connected to 5GCN by NB-IoT (see 3GPP TS 36.300 [56], 3GPP TS 36.331 [22], 3GPP TS 36.306 [54]).

**In WB-N1 mode:** Indicates this paragraph applies only to a system which operates in WB-N1 mode. For a multi-access system this case applies if the system operates in N1 mode with E-UTRA connected to 5GCN, but not in NB-N1 mode.

**In S1 mode,...:** Indicates this clause applies only to an EPS. The S1 mode includes WB-S1 mode and NB-S1 mode. For multi system case this is determined by the current serving radio access network.

**In NB-S1 mode:** Indicates this paragraph applies only to a system which operates in NB-S1 mode. For a multi-access system this case applies if the current serving radio access network provides access to network services via E-UTRA by NB-IoT (see 3GPP TS 36.300 [56], 3GPP TS 36.331 [22], 3GPP TS 36.306 [54]).

**In WB-S1 mode:** Indicates this paragraph applies only to a system which operates in WB-S1 mode. For a multi-access system this case applies if the system operates in S1 mode, but not in NB-S1 mode.

**Limited Service State:** See subclause 3.5.

**Localised Service Area (LSA):** A localised service area consists of a cell or a number of cells. The cells constituting a LSA may not necessarily provide contiguous coverage.

**Location Registration (LR):** An MS which is IMSI attached to non-GPRS services only performs location registration by the Location Updating procedure. A GPRS MS which is IMSI attached to GPRS services or to GPRS and non-GPRS services performs location registration by the Routing Area Update procedure only when in a network of network operation mode I. Both location updating and routing area update procedures are performed independently by the GPRS MS when it is IMSI attached to GPRS and non-GPRS services in a network of network operation mode II (see 3GPP TS 23.060 [27]). An MS which is attached via the E-UTRAN performs location registration by the tracking area update procedure. An MS which is registered via the NG-RAN performs location registration by the mobility registration update procedure.

**MS:** Mobile Station. The present document makes no distinction between MS and UE.

**N1 mode capability:** Capability of the UE associated with an N1 NAS signalling connection between the UE and network. The present document refers to the N1 mode capability over 3GPP access only (see 3GPP TS 24.501 [64]).

**NarrowBand Internet of Things (NB-IoT):** NB-IoT is a non-backward compatible variant of E-UTRAN supporting a reduced set of functionality. NB-IoT allows access to EPC or 5GCN network services via E-UTRA with a channel bandwidth limited to 180 kHz (see 3GPP TS 36.300 [20], 3GPP TS 36.331 [42], 3GPP TS 36.306 [44]).

**Network Type:** The network type associated with HPLMN or a PLMN on the PLMN selector (see 3GPP TS 31.102 [40]). The MS uses this information to determine what type of radio carrier to search for when attempting to select a specific PLMN. A PLMN may support more than one network type.

**Registered PLMN (RPLMN):** This is the PLMN on which certain LR outcomes have occurred (see table 1). In a shared network the RPLMN is the PLMN defined by the PLMN identity of the CN operator that has accepted the LR.

**Registered SNPN (RSNPN):** This is the SNPN on which certain LR outcomes have occurred. In a shared network the RSNPN is the SNPN defined by the SNPN identity of the CN operator that has accepted the LR.

**Registration:** This is the process of camping on a cell of the PLMN or the SNPN and doing any necessary LRs.

**Registration Area:** A registration area is an area in which mobile stations may roam without a need to perform location registration. The registration area corresponds to location area (LA) for performing location updating procedure, to routing area for performing the GPRS attach or routing area update procedures, and to a list of tracking areas (TAs) for performing the EPS attach, tracking area update, or 5GS registration procedure.

The PLMN to which a cell belongs (PLMN identity):

- for GERAN, in the system information (MCC + MNC part of LAI) broadcast as specified in 3GPP TS 44.018 [34];

- for UTRA, see the broadcast information as specified in 3GPP TS 25.331 [33];

- for E-UTRA, see the broadcast information as specified in 3GPP TS 36.331 [42]; and

- for NR, see the broadcast information as specified in 3GPP TS 38.331 [65].

The SNPN to which a cell belongs (SNPN identity):

- for NR, see the broadcast information as specified in 3GPP TS 38.331 [65].

In a shared network, a cell belongs to all PLMNs given in the system information broadcasted as specified in 3GPP TS 44.018 [34] for GERAN, in 3GPP TS 25.331 [33] for UTRAN, and in 3GPP TS 36.331 [42] for E-UTRAN, and a cell belongs to all PLMNs, all SNPNs, or all PLMNs and all SNPNs, given in the system information broadcasted as specified in 3GPP TS 36.331 [42] for E-UTRA connected to 5GCN, and in 3GPP TS 38.331 [65] for NR.

**Secured packet:** In this specification, a secured packet contains the list of preferred PLMN/access technology combinations encapsulated with a security mechanism as described in 3GPP TS 31.115 [67].

**Selected PLMN:** This is the PLMN that has been selected according to subclause 3.1, either manually or automatically.

**Selected SNPN:** This is the SNPN that has been selected according to subclause 3.9, either manually or automatically.

**Shared Network:** An MS considers a cell to be part of a shared network, when multiple PLMN identities are received as specified in 3GPP TS 44.018 [34] for GERAN, in 3GPP TS 25.331 [33] for UTRAN, and in 3GPP TS 36.331 [42] for E-UTRAN, and when multiple PLMN identities, multiple SNPN identities or one or more PLMN identities and one or more SNPN identities are received as specified in 3GPP TS 36.331 [42] for E-UTRA connected to 5GCN, and in 3GPP TS 38.331 [65] for NR.

**SIM:** Subscriber Identity Module (see 3GPP TS 21.111 [38]). The present document makes no distinction between SIM and USIM.

**SNPN identity**: a PLMN ID and an NID combination.

**SoLSA exclusive access:** Cells on which normal camping is allowed only for MS with Localised Service Area (LSA) subscription.

**Suitable Cell:** This is a cell on which an MS may camp. It must satisfy criteria which are defined for GERAN A/Gb mode in 3GPP TS 43.022 [35], for UTRAN in 3GPP TS 25.304 [32], for E-UTRAN in 3GPP TS 36.304 [43] and for NG-RAN see 3GPP TS 36.304 [43] and 3GPP TS 38.304 [61]. For 3GPP2 access technologies the criteria are defined in 3GPP2 C.S0011 [45] for cdma2000® 1xRTT and in 3GPP2 C.S0033 [46] for cdma2000® HRPD. For an MS in eCall only mode, a suitable cell must further satisfy the criteria defined in subclause 4.4.3.1.1.

**Steering of Roaming (SOR):** A technique whereby a roaming UE is encouraged to roam to a preferred roamed-to-network indicated by the HPLMN.

**Steering of Roaming application function (SOR-AF):** An application function that can provide UDM with one of the following:

a) list of preferred PLMN/access technology combinations;

b) a secured packet; or

c) neither of them,

generated dynamically based on operator specific data analytics solutions.

**Steering of Roaming information:** This consists of the following HPLMN protected information (see 3GPP TS 33.501 [66]):

a) an indication of whether the UDM requests an acknowledgement from the UE for successful reception of the steering of roaming information; and

b) one of the following:

1) list of preferred PLMN/access technology combinations with an indication that it is included;

2) a secured packet with an indication that it is included; or

3) the HPLMN indication that 'no change of the "Operator Controlled PLMN Selector with Access Technology" list stored in the UE is needed and thus no list of preferred PLMN/access technology combinations is provided'.

**Visited PLMN**: This is a PLMN different from the HPLMN (if the EHPLMN list is not present or is empty) or different from an EHPLMN (if the EHPLMN list is present).

For the purposes of the present document, the following terms and definitions given in 3GPP TS 23.167 [57] apply:

**eCall over IMS**

**EPC**

**E-UTRAN**

For the purposes of the present document, the following terms and definitions given in 3GPP TS 23.401 [58] apply:

**eCall only mode**

For the purposes of the present document, the following terms and definitions given in 3GPP TS 23.221 [69] apply:

**Restricted local operator services (RLOS)**

For the purposes of the present document, the following terms and definitions given in 3GPP TS 23.501 [62] apply:

**Closed Access Group (CAG)**

**Network identifier (NID)**

**NG-RAN**

**Stand-alone Non-Public Network (SNPN)**

**SNPN access mode**

For the purposes of the present document, the following terms and definitions given in 3GPP TS 24.501 [64] apply:

**5GCN**

**Emergency PDU session**

**Initial registration for emergency services**

**Registered for emergency services**

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* NEXT CHANGE \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

##### 4.4.3.1.1 Automatic Network Selection Mode Procedure

The MS selects and attempts registration on other PLMN/access technology combinations, if available and allowable, in the following order:

i) either the HPLMN (if the EHPLMN list is not present or is empty) or the highest priority EHPLMN that is available (if the EHPLMN list is present) ;

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

iii) each PLMN/access technology combination 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;

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

When following the above procedure the following requirements apply:

a) An MS with voice capability shall ignore PLMNs for which the MS has identified at least one GSM COMPACT.

b) In A/Gb mode or GSM COMPACT, an MS with voice capability, or an MS not supporting packet services shall not search for CPBCCH carriers.

c) In ii and iii, the MS should limit its search for the PLMN to the access technology or access technologies associated with the PLMN in the appropriate PLMN Selector with Access Technology list (User Controlled or Operator Controlled selector list).

 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 use the "PLMN Selector" data file, for each PLMN in the "PLMN Selector" data file, the MS shall search for all access technologies it is capable of. The priority ordering amongst the access technologies is implementation dependent.

d) In iv and v, the MS shall search for all access technologies it is capable of, before deciding which PLMN to select.

e) In ii, and iii, a packet only MS which supports GSM COMPACT, but 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 use the "PLMN Selector" data file, for each PLMN in the "PLMN Selector" data file, the MS shall search for all access technologies it is capable of and shall assume GSM COMPACT access technology as the lowest priority radio access technology.

f) In i, the MS shall search for all access technologies it is capable of. No priority is defined for the preferred access technology and the priority is an implementation issue, but "HPLMN Selector with Access Technology" data file on the SIM may be used to optimise the procedure.

g) In i, an MS using a SIM without access technology information storage (i.e. the "HPLMN Selector with Access Technology" data file is not present) shall search for all access technologies it is capable of. The priority ordering amongst the access technologies is implementation dependent. A packet only MS which supports GSM COMPACT using a SIM without access technology information storage shall also assume GSM COMPACT access technology as the lowest priority radio access technology.

NOTE 1: For f) and g), the MS in automatic network selection mode can end the PLMN search procedure once the HPLMN or the highest priority EHPLMN is found on an access technology.

NOTE 2: For i, ii and iii, the MS can use location information to determine which PLMNs can be available in its present location.

h) In v, the MS shall order the PLMN/access technology combinations in order of decreasing signal quality within each access technology. The order between PLMN/access technology combinations with different access technologies is an MS implementation issue.

NOTE 3: Requirements a) and b) apply also to requirement d), so a GSM voice capable MS should not search for GSM COMPACT PLMNs, even if capable of GSM COMPACT.

NOTE 4: Requirements a) and b) apply also to requirement f), so a GSM voice capable MS should not search for GSM COMPACT PLMNs, even if this is the only access technology on the "HPLMN Selector with Access Technology" data file on the SIM.

NOTE 5: High quality signal is defined in the appropriate AS specification.

i) In i to v, the MS shall not consider PLMNs where voice service was not possible as PLMN selection candidate, unless such PLMN is available in GERAN or UTRAN or no other allowed PLMN is available.

j) In i to v, if the MS only supports EMM-REGISTERED without PDN connection (see 3GPP TS 24.301 [23A]), the MS shall not consider PLMNs which do not advertise support of EMM-REGISTERED without PDN connection.

k) In i to v, if the MS only supports control plane CIoT EPS optimization (see 3GPP TS 24.301 [23A]) and the MS camps on a E-UTRA cell which is not NB-IoT cell (see 3GPP TS 36.304 [43], 3GPP TS 36.331 [22]), the MS shall not consider PLMNs which do not advertise support of EPS services with control plane CIoT EPS optimization.

l) In i to v, if the MS is in eCall only mode, the MS shall not consider PLMNs which do not advertise support for eCall over IMS, unless such PLMNs are available in GERAN or UTRAN.

NOTE 6: As an implementation option, an MS in eCall only mode that was not able to select any PLMN according to l) can perform a second iteration of i to v with no restriction.

m) In i to v, if the MS supports CAG and is provisioned with a non-empty "CAG information list", the MS shall not consider a PLMN indicated by an NG-RAN cell only if:

1) the cell is a CAG cell and broadcasts a CAG-ID for the PLMN such that 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

2) the cell is not a CAG cell and:

- there is no entry with the PLMN ID of the PLMN in the "CAG information list"; or

- there exists an entry with the PLMN ID of the PLMN in the "CAG information list" but the "indication that the MS is only allowed to access 5GS via CAG cells" is not included in the entry.

m1) In i, if the MS supports CAG and operates in CAG-only access mode, but hasn’t been configured with a "CAG information list", the MS shall consider a PLMN indicated by an NG-RAN cell when it is a CAG cell.

n) In i to v, if the MS only supports control plane CIoT 5GS optimization (see 3GPP TS 23.501 [62]) and the MS camps on an E-UTRA cell connected to 5GCN, which is not NB-IoT cell (see 3GPP TS 36.304 [43], 3GPP TS 36.331 [22]), the MS shall not consider PLMNs which do not advertise support of 5GS services with control plane CIoT 5GS optimization.

o) In i to v, if the MS supports CIoT 5GS optimizations, the MS shall not consider the PLMN/access technology combinations for which the MS preferred CIoT network behaviour is not advertised as supported by the PLMN/access technology combination (see 3GPP TS 24.501 [64]).

NOTE 7: As an implementation option, the MS supporting CIoT 5GS optimizations that was not able to select any PLMN according to o) can perform a second iteration of i to v with no restriction.

p) In iii, the MS shall use the PLMN/access technology combination in the "Operator Controlled PLMN Selector with Access Technology" stored in the ME, if the last received steering of roaming information contains the "list of preferred PLMN/access technology combinations"(see annex C) and is stored in the ME. Otherwise, the MS shall use the "Operator Controlled PLMN Selector with Access Technology" list retrieved from the SIM.

If successful registration is achieved, the MS indicates the selected PLMN.

If registration cannot be achieved because no PLMNs are available and allowable, and the MS does not support access to RLOS, the MS indicates "no service" to the user, waits until a new PLMN is available and allowable and then repeats the procedure.

If there were one or more PLMNs which were available and allowable, but an LR failure made registration on those PLMNs unsuccessful or an entry in any of the lists "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", or "CAG information list" prevented a registration attempt, the MS selects the first such PLMN again and enters a 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 shall select a PLMN offering access to RLOS as follows:

a) if at least one preferred PLMN exists based on 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]) and 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]), the MS shall select the preferred PLMN offering access to RLOS and indicate the selected preferred PLMN for access to RLOS; and

b) if none of the preferred PLMNs for access to RLOS is available, the MS shall evaluate the remaining PLMNs offering access to RLOS that are not in the RLOS preferred PLMN list. If the MCC part of a 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]), the MS shall select this PLMN and indicate the selected PLMN for access to RLOS.

If registration cannot be achieved because no PLMNs are available and allowable, and if no PLMN offering access to RLOS has been found, or none of the PLMNs offering access to RLOS is allowed to be accessed according to 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]), or the MS does not support access to RLOS, the MS indicates "no service" to the user, waits until a new PLMN is available and then repeats the procedure.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* END of CHANGE \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*