**3GPP TSG-WG SA2 Meeting #156e *S2-2304091***

**E-Meeting April 17 – 21, 2023 (revision of)**

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| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
|  |
|  | **23.501** | **CR** | **4203** | **rev** | **-** | **Current version:** | **18.1.0** |  |
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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 | **X** |

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| ***Title:***  | Allowed CAG list with location validity |
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| ***Source to WG:*** | Ericsson |
| ***Source to TSG:*** | SA2 |
|  |  |
| ***Work item code:*** | eNPN\_Ph2, VMR |  | ***Date:*** | 2023-03-20 |
|  |  |  |  |  |
| ***Category:*** | **C** |  | ***Release:*** | Rel-18 |
|  | *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-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)* |
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| ***Reason for change:*** | In clause 5.35A.7, control of UE’s access to MBSR was introduced with reference to the CAG mechanism of clause 5.30.3. The Allowed CAG list was enhanced with time duration restriction and location restrictions.The Allowed CAG list been extended with time validity but not yet location validity. |
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| ***Summary of change:*** | Adding support for location validity to Allowed CAG list. |
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| ***Consequences if not approved:*** | Inconsistent specification |
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| ***Clauses affected:*** | 5.30.3.3, 5.30.3.4, 5.35A.7 |
|  |  |
|  | **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 \* \* \* \*

#### 5.30.3.3 UE configuration, subscription aspects and storage

To use CAG, the UE, that supports CAG as indicated as part of the UE 5GMM Core Network Capability, may be pre-configured or (re)configured with the following CAG information, included in the subscription as part of the Mobility Restrictions:

- an Allowed CAG list i.e. a list of CAG Identifiers the UE is allowed to access; and

- each entry of the Allowed CAG list may be associated with time validity information and/or location validity information (a list of Tracking Area Codes or operator specific area code(s) representing a range of TAs); and

- optionally, a CAG-only indication whether the UE is only allowed to access 5GS via CAG cells (see TS 38.304 [50] for how the UE identifies whether a cell is a CAG cell);

The HPLMN may configure or re-configure a UE with the above CAG information using the UE Configuration Update procedure for access and mobility management related parameters described in clause 4.2.4.2 of TS 23.502 [3].

The above CAG information is provided by the HPLMN on a per PLMN basis. In a PLMN the UE shall only consider the CAG information provided for this PLMN. The entries of the Allowed CAG list with validity condition is provided to the UE only if the UE indicates support of CAG with validity information.

When the subscribed CAG information changes, UDM sets a CAG information Subscription Change Indication and sends it to the AMF. The AMF shall provide the UE with the CAG information when the UDM indicates that the CAG information within the Access and Mobility Subscription data has been changed. When AMF receives the indication from the UDM that the CAG information within the Access and Mobility Subscription has changed, the AMF uses the CAG information received from the UDM to update the UE. Once the AMF updates the UE and obtains an acknowledgment from the UE, the AMF informs the UDM that the update was successful and the UDM clears the CAG information Subscription Change Indication flag. If the Allowed CAG list includes location validity information with operator specific area code(s), the AMF converts them to Tracking Area Codes before sending the Allowed CAG list to the UE.

The AMF may update the UE using either the UE Configuration Update procedure after registration procedure is completed, or by including the new CAG information in the Registration Accept or in the Registration Reject or in the Deregistration Request or in the Service Reject.

When the UE is roaming and the Serving PLMN provides CAG information, the UE shall update only the CAG information provided for the Serving PLMN while the stored CAG information for other PLMNs are not updated. When the UE is not roaming and the HPLMN provides CAG information, the UE shall update the CAG information stored in the UE with the received CAG information for all the PLMNs.

The UE shall store the latest available CAG information for every PLMN for which it is provided and keep it stored when the UE is de-registered or switched off, as described in TS 24.501 [47].

The CAG information is only applicable with 5GS.

NOTE: CAG information has no implication on whether and how the UE accesses 5GS over non-3GPP access.

#### 5.30.3.4 Network and cell (re-)selection, and access control

The following is assumed for network and cell selection, and access control:

- The CAG cell shall broadcast information such that only UEs supporting CAG are accessing the cell (see TS 38.300 [27], TS 38.304 [50]);

NOTE 1: The above also implies that cells are either CAG cells or normal PLMN cells. For network sharing scenario between SNPN, PNI-NPN and PLMNs, please see clause 5.18.

- In order to prevent access to NPNs for authorized UE(s) in the case of network congestion/overload, existing mechanisms defined for Control Plane load control, congestion and overload control in clause 5.19 can be used, as well as the access control and barring functionality described in clause 5.2.5, or Unified Access Control using the access categories as defined in TS 24.501 [47] can be used.

- For aspects of automatic and manual network selection in relation to CAG, see TS 23.122 [17];

- For aspects related to cell (re-)selection, see TS 38.304 [50];

- The Mobility Restrictions shall be able to restrict the UE's mobility according to the Allowed CAG list (if configured in the subscription) and include an indication whether the UE is only allowed to access 5GS via CAG cells (if configured in the subscription) as described in clause 5.30.3.3;

- The AMF shall update the Allowed CAG list in the Mobility Restrictions towards NG-RAN if the validity condition of an entry in the Allowed CAG list changes between valid and invalid. In case of location validity information, AMF provides CAG Identifier(s) in the Allowed CAG list to the NG-RAN, if any of the NG-RAN supported TAs is part of the location validity information associated with the CAG Identifier(s).

- AMF may release the UE based on operator’s policy if the evaluation of the time validity condition changes from true to false, or if the TA of the UE’s ULI is no longer part of the location validity information.

- During transition from CM-IDLE to CM-CONNECTED and during Registration after connected mode mobility from E-UTRAN to NG-RAN as described in clause 4.11.1.2.2 of TS 23.502 [3]:

- The AMF shall verify whether UE access is allowed by Mobility Restrictions:

NOTE 2: It is assumed that the AMF is made aware of the supported CAG Identifier(s) of the CAG cell by the NG-RAN.

- If the UE is accessing the 5GS via a CAG cell and if at least one of the CAG Identifier(s) received from the NG-RAN is part of the UE's Allowed CAG list, then the AMF accepts the NAS request;

- If the UE is accessing the 5GS via a CAG cell and if none of the CAG Identifier(s) received from the NG-RAN are part of the UE's Allowed CAG list, then the AMF rejects the NAS request and the AMF should include CAG information in the NAS reject message. The AMF shall then release the NAS signalling connection for the UE by triggering the AN release procedure; and

- If the UE is accessing the 5GS via a non-CAG cell and the UE's subscription contains an indication that the UE is only allowed to access CAG cells, then the AMF rejects the NAS request and the AMF should include CAG information in the NAS reject message. The AMF shall then release the NAS signalling connection for the UE by triggering the AN release procedure.

- During transition from RRC\_INACTIVE to RRC\_CONNECTED state:

- When the UE initiates the RRC Resume procedure for RRC\_INACTIVE to RRC\_CONNECTED state transition in a CAG cell, NG-RAN shall reject the RRC Resume request from the UE if none of the CAG Identifiers supported by the CAG cell are part of the UE's Allowed CAG list according to the Mobility Restrictions received from the AMF or if no Allowed CAG list has been received from the AMF.

- When the UE initiates the RRC Resume procedure for RRC\_INACTIVE to RRC\_CONNECTED state transition in a non-CAG cell, NG-RAN shall reject the UE's Resume request if the UE is only allowed to access CAG cells according to the Mobility Restrictions received from the AMF.

- During connected mode mobility procedures within NG-RAN, i.e. handover procedures as described in clause 4.9.1 of TS 23.502 [3]:

- Source NG-RAN shall not handover the UE to a target NG-RAN node if the target is a CAG cell and none of the CAG Identifiers supported by the CAG cell are part of the UE's Allowed CAG list in the Mobility Restriction List or if no Allowed CAG list has been received from the AMF;

- Source NG-RAN shall not handover the UE to a non-CAG cell if the UE is only allowed to access CAG cells based on the Mobility Restriction List;

- If the target cell is a CAG cell, target NG-RAN shall reject the N2 based handover procedure if none of the CAG Identifiers supported by the CAG cell are part of the UE's Allowed CAG list in the Mobility Restriction List or if no Allowed CAG list has been received from the AMF;

- If the target cell is a non-CAG cell, target NG-RAN shall reject the N2 based handover procedure if the UE is only allowed to access CAG cells based on the Mobility Restriction List.

- Update of Mobility Restrictions:

- When the AMF receives the Nudm\_SDM\_Notification from the UDM and the AMF determines that the Allowed CAG list or the indication whether the UE is only allowed to access CAG cells have changed;

- The AMF shall update the Mobility Restrictions in the UE and NG-RAN accordingly under the conditions as described in clause 4.2.4.2 of TS 23.502 [3].

NOTE 3: When the UE is accessing the network for emergency services the conditions for AMF in clause 5.16.4.3 apply.

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

### 5.35A.7 Control of UE access to MBSR

CAG Identifier is used to control the access of UE via MBSR (i.e. mobile IAB-node) and existing CAG mechanism defined in clause 5.30.3 can be used for managing UE's access to MBSR, with the following additional considerations:

- When the MBSR is allowed to operate as an IAB node for a PLMN, the MBSR is configured, either during the communication with the serving PLMN OAM or (pre-)configuration mechanism, with a CAG identifier which is unique within the scope of this PLMN. If the MBSR is (pre-)configured with the PLMN list in which the MBSR is allowed to operate as MBSR, the corresponding CAG Identifier per PLMN is also configured in the MBSR. See MBSR configuration in clause 5.35A.2.

- NG-RAN and 5GC support the UE access control based on the CAG identifier associated with the MBSR cell and the allowed CAG identifiers for the UE that supports CAG functionality.

- For the UE that does not support CAG functionality, NG-RAN and 5GC are allowed to use not only CAG mechanism but also the other existing mechanism e.g. forbidden Tracking Area, to manage its access to MBSR.

NOTE 1: If CAG for both MBSR and fixed private network are supported in a PLMN, the CAG identifier value of the MBSR cell(s) need to be different from the CAG identifier(S) of fixed cell(s) and unique within the scope of a PLMN ID. The CAG identifiers in a PLMN can be defined based on the categorization of the MBSR (e.g. public transport vs public safety).

- Time duration restriction and location restriction information may be provided together with the CAG Identifier(s) for the MBSR(s) that the UE can access. The Allowed CAG list associated with validity information will be provided to UE and AMF for enforcement, to make sure that UE not accessing the MBSR cell outside of the time duration or location restriction area. For example, if the time when a certain CAG is allowed for a UE is up or UE is out of the geographic area, the CAG for the UE is revoked from the network. Use of the Allowed CAG list associated with validity information for network and cell (re-)selection and access control is described in clause 5.30.3.4.

NOTE 2: Control of the MBSR access to the serving network is based on normal mobility restriction management based on subscription data form MBSR (i.e. IAB-UE).

\* \* \* \* End of changes \* \* \* \*