**3GPP TSG-CT WG1 Meeting #133-bis-eC1-220388**

**E-meeting, 17-21 January 2022**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **24.501** | **CR** | **3931** | **rev** | **-** | **Current version:** | **17.5.0** |  |
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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:*** | Support for Service Area Restrictions and Forbidden Tracking Area in satellite NG-RAN access | | | | | | | | | |
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| ***Source to WG:*** | Xiaomi | | | | | | | | | |
| ***Source to TSG:*** | C1 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | 5GSAT\_ARCH-CT | | | | |  | ***Date:*** | | | 2022-Jan-10 |
|  |  | | | |  | |  | | |  |
| ***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 can be 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:*** | | S2-2109097 was approved in last SA2 meeting with the following text in 23.501:  *The AMF receives the broadcast TAI (if a single TAI is broadcast) or all broadcast TAIs (if multiple TAIs are broadcast) from the NG-RAN as described clause 5.4.11.7. The AMF rejects the UE from accessing the network if the only received TAI is forbidden or if all received TAIs are forbidden based on subscription data. The UE is not permitted to initiate any communication with the network for this PLMN if the only broadcast TAI is forbidden or if all broadcast TAIs are forbidden. The UE considers it is not within a Forbidden Area in case at least one broadcast TAI is not forbidden.*  *The AMF receives the broadcast TAI (if a single TAI is broadcast) or all broadcast TAIs (if multiple TAIs are broadcast) from the NG-RAN as described clause 5.4.11.7. The AMF provides the UE with Service Area Restrictions which consist of either Allowed Areas or Non-Allowed Areas, as described in clause 5.3.4.1.2.* *The UE and AMF consider the UE to be in a Non-Allowed Area if none of the broadcast TAIs is Allowed. The UE and AMF consider the UE to be in an Allowed Area if at least one broadcast TAI is allowed.*  This contributoin gives correspond changes to the forbidden tracking area and service area restriction handling in subclause 5.2.2.3.3, 5.2.3.2.3 and 5.3.5.2 to support satellite access. | | | | | | | | |
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| ***Summary of change:*** | | When the UE using satellite NG-RAN access, the UE is not permitted to communicate with the network if the only broadcast TAI all broadcast TAIs is in the list of forbidden tracking areas. The UE can communicate with the network if at least one broadcast TAI is not in the list of forbidden tracking areas.  The UE and network consider the UE to be in a Non-Allowed Area if none of the broadcast TAIs is Allowed. The UE and network consider the UE to be in an Allowed Area if at least one broadcast TAI is allowed. | | | | | | | | |
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| ***Consequences if not approved:*** | | Incorrect handling of Forbidden Tracking Area and Service Area Restriction to UE via satellite NG-RAN access.wrong control of communication between UE and network based on UE subscription data. | | | | | | | | |
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| ***Clauses affected:*** | | 5.2.2.3.3, 5.2.3.2.3, 5.3.5.2 | | | | | | | | |
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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 ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

*\*\*\* first change \*\*\**

##### 5.2.2.3.3 ATTEMPTING-REGISTRATION

The UE in 3GPP access:

a) shall initiate an initial registration procedure on the expiry of timers T3502, T3511 or T3346;

b) may initiate an initial registration procedure for emergency services even if timers T3502, T3511 or T3346 are running;

b1) may initiate an initial registration procedure even if timer T3346 is running, if the UE is a UE configured for high priority access in selected PLMN;

c) shall initiate an initial registration procedure when entering a new PLMN or SNPN, except

i) if timer T3346 is running and the new PLMN is equivalent to the PLMN where the UE started timer T3346;

ii) if the PLMN identity of the new cell is in the forbidden PLMN lists or the SNPN identity of the new cell is in the "permanently forbidden SNPNs" list or the "temporarily forbidden SNPNs" list which are, if the MS supports access to an SNPN using credentials from a credentials holder, associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription; or

iii) if the tracking area of the new cell is in one of the lists of 5GS forbidden tracking areas if the all the tracking areas indicated by the the new satellite NG-RAN cell are in one of the lists of 5GS forbidden tracking areas;

d) shall initiate an initial registration procedure when the tracking area of the serving cell has changed, if timer T3346 is not running, the PLMN identity of the new cell is not in one of the forbidden PLMN lists or the SNPN identity of the new cell is in neither the "permanently forbidden SNPNs" list nor the "temporarily forbidden SNPNs" list which are, if the MS supports access to an SNPN using credentials from a credentials holder, associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription, and the tracking area of the new cell is not in one of the lists of 5GS forbidden tracking areas or if at least one tracking area of the new satellite NG-RAN cell is not in one of the lists of 5GS forbidden tracking areas;

e) shall initiate an initial registration procedure if the 5GS update status is set to 5U2 NOT UPDATED, and timers T3511, T3502 and T3346 are not running;

f) may initiate an initial registration procedure for UE in NB-N1 mode upon receiving a request from upper layers to transmit user data related to an exceptional event and the UE is allowed to use exception data reporting (see the ExceptionDataReportingAllowed leaf of the NAS configuration MO in 3GPP TS 24.368 [17]) if timer T3346 is not already running for "MO exception data" and even if timer T3502 or timer T3511 is running; and

g) may initiate an initial registration procedure with 5GS registration type IE set to "initial registration" for initiating of an emergency PDU session, upon request of the upper layers to establish the emergency PDU session.

The UE in non-3GPP access:

a) shall initiate an initial registration procedure on the expiry of timers T3502, T3511 or T3346;

b) may initiate an initial registration procedure for emergency services even if timers T3502, T3511 or T3346 are running;

b1) may initiate an initial registration procedure even if timer T3346 is running if the UE is a UE configured for high priority access in selected PLMN;

c) shall initiate an initial registration procedure when entering a new PLMN, except if timer T3346 is running and the new PLMN is equivalent to the PLMN where the UE started timer T3346;

d) shall initiate an initial registration procedure if the 5GS update status is set to 5U2 NOT UPDATED, and timers T3511, T3502 and T3346 are not running; and

e) may initiate an initial registration procedure with 5GS registration type IE set to "initial registration" for initiating of an emergency PDU session, upon request of the upper layers to establish the emergency PDU session.

*\*\*\* second change \*\*\**

##### 5.2.3.2.3 ATTEMPTING-REGISTRATION-UPDATE

The UE in 3GPP access:

a) shall not send any user data;

b) shall initiate a registration procedure for mobility and periodic registration update on the expiry of timers T3502, T3511 or T3346;

c) shall initiate a registration procedure for mobility and periodic registration update when entering a new PLMN, if timer T3346 is running and the new PLMN is not equivalent to the PLMN where the UE started timer T3346, the PLMN identity of the new cell is not in the forbidden PLMN lists, and the tracking area of the new cell is not in one of the lists of 5GS forbidden tracking areas or at least one tracking area of the new satellite NG-RAN cell is not in one of the lists of 5GS forbidden tracking areas;

d) shall initiate a registration procedure for mobility and periodic registration update when the tracking area of the serving cell has changed, if timer T3346 is not running, the PLMN identity of the new cell is not in one of the forbidden PLMN lists or the SNPN identity of the new cell is in neither the "permanently forbidden SNPNs" list nor the "temporarily forbidden SNPNs" list which are, if the MS supports access to an SNPN using credentials from a credentials holder, associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription, and the tracking area of the new cell is not in one of the lists of 5GS forbidden tracking areas or if at least one tracking area of the new satellite NG-RAN cell is not in one of the lists of 5GS forbidden tracking areas;

e) may initiate a registration procedure for mobility and periodic registration update upon request of the upper layers to establish an emergency PDU session;

e1) may initiate a registration procedure for mobility and periodic registration update upon request of the upper layers to establish a PDU session, if the UE is a UE configured for high priority access in selected PLMN;

f) may perform de-registration locally and initiate a registration procedure for initial registration for emergency services even if timer T3346 is running;

g) shall initiate registration procedure for mobility and periodic registration update upon reception of paging, or upon reception of NOTIFICATION message with access type indicating 3GPP access;

NOTE: As an implementation option, the MUSIM capable UE is allowed to not respond to paging based on the information available in the paging message, e.g. voice service indication.

h) may initiate a registration procedure for mobility and periodic registration update upon request for an MMTEL voice call, MMTEL video call, or an MO IMS registration related signalling from the upper layers, and none of the following conditions is met:

- timer T3346 is running;

- the UE has stored a list of "non-allowed tracking areas" and the UE is camped on a cell which is in the registered PLMN or a PLMN from the list of equivalent PLMNs whose TAI is in the list of "non-allowed tracking areas"; or

- the UE has stored a list of "allowed tracking areas" and the UE is not camped on a cell which is in the registered PLMN or a PLMN from the list of equivalent PLMNs whose TAI is in the list of "allowed tracking areas";

i) shall initiate a registration procedure for mobility and periodic registration update if the 5GS update status is set to 5U2 NOT UPDATED, and timers T3511, T3502 and T3346 are not running;

j) if configured for eCall only mode as specified in 3GPP TS 31.102 [22], shall perform the eCall inactivity procedure at expiry of timer T3444 or timer T3445 (see subclause 5.5.3);

k) may initiate a registration procedure for mobility and periodic registration update for UE in NB-N1 mode upon receiving a request from upper layers to transmit user data related to an exceptional event and the UE is allowed to use exception data reporting (see the ExceptionDataReportingAllowed leaf of the NAS configuration MO in 3GPP TS 24.368 [17]) if timer T3346 is not already running for "MO exception data" and even if timer T3502 or timer T3511 is running; and

l) shall not initiate the de-registration signalling procedure unless the current TAI is part of the TAI list.

The UE in non-3GPP access:

a) shall not send any user data;

b) shall initiate the registration procedure for mobility and periodic registration update on the expiry of timers T3502, T3511 or T3346;

c) may initiate a registration procedure for mobility registration update upon request of the upper layers to establish an emergency PDU session;

c1) may initiate a registration procedure for mobility and periodic registration update upon request of the upper layers to establish a PDU session, if the UE is a UE configured for high priority access in selected PLMN;

d) may perform de-registration locally and initiate a registration procedure for initial registration for emergency services even if timer T3346 is running;

e) may initiate a registration procedure for mobility and periodic registration update upon request for an MMTEL voice call, MMTEL video call, or an MO IMS registration related signalling from the upper layers, if timer T3346 is not running;

f) shall initiate a registration procedure for mobility and periodic registration update if the 5GS update status is set to 5U2 NOT UPDATED, and timers T3511, T3502 and T3346 are not running; and

g) shall not initiate the de-registration signalling procedure unless timer T3346 is running.

*\*\*\* third change \*\*\**

#### 5.3.5.2 3GPP access service area restrictions

The service area restrictions consist of tracking areas forming either an allowed area, or a non-allowed area. The tracking areas belong to either the registered PLMN or its equivalent PLMNs in the registration area. The allowed area can contain up to 16 tracking areas or include all tracking areas in the registered PLMN and its equivalent PLMN(s) in the registration area. The non-allowed area can contain up to 16 tracking areas. The network conveys the service area restrictions to the UE by including either an allowed area, or a non-allowed area, but not both, in the Service area list IE of a REGISTRATION ACCEPT message or a CONFIGURATION UPDATE COMMAND message.

If the network does not convey the service area restrictions to the UE in the Service area list IE of a REGISTRATION ACCEPT message, the UE shall treat all tracking areas in the registered PLMN and its equivalent PLMN(s) in the registration area as allowed area and delete the stored list of "allowed tracking areas" or the stored list of "non-allowed tracking areas".

When the UE receives a Service area list IE with an allowed area indication during a registration procedure or a generic UE configuration update procedure:

a) if the "Type of list" included in the Service area list IE does not indicate "all TAIs belonging to the PLMNs in the registration area are allowed area", the UE shall delete the old list of "allowed tracking areas" and store the tracking areas in the allowed area as the list of "allowed tracking areas". If the UE has a stored list of "non-allowed tracking areas", the UE shall delete that list; or

b) if the "Type of list" included in the Service area list IE indicates "all TAIs belonging to the PLMNs in the registration area are allowed area", the UE shall treat all tracking areas in the registered PLMN and its equivalent PLMN(s) as allowed area and delete the stored list of "allowed tracking areas" or the stored list of "non-allowed tracking areas".

When the UE receives a Service area list IE with a non-allowed area indication during a registration procedure or a generic UE configuration update procedure, the UE shall delete the old list of "non-allowed tracking areas" and store the tracking areas in the non-allowed area as the list of "non-allowed tracking areas". If the UE has a stored list of "allowed tracking areas", the UE shall delete that list.

If the UE is successfully registered to a PLMN and has a stored list of "allowed tracking areas":

a) while camped on a cell whose TAI is in the list of "allowed tracking areas" or while camped on a satellite NG-RAN cell and at least one TAI of the cell is in the list of "allowed tracking areas", the UE shall stay in, or enter, the state 5GMM-REGISTERED.NORMAL-SERVICE and is allowed to initiate any 5GMM and 5GSM procedures; and

b) while camped on a cell which is in the registered PLMN or a PLMN from the list of equivalent PLMNs and whose TAI is not in the list of "allowed tracking areas" or while camped on a satellite NG-RAN cell which is in the registered PLMN or a PLMN from the list of equivalent PLMNs and none of the TAIs of the cell is in the list of "allowed tracking areas", the UE shall enter the state 5GMM-REGISTERED.NON-ALLOWED-SERVICE, and:

1) if the UE is in 5GMM-IDLE mode or 5GMM-IDLE mode with suspend indication over 3GPP access, the UE:

i) shall not include the Uplink data status IE in the registration procedure for mobility and periodic registration update except for emergency services or for high priority access;

ii) shall not perform the registration procedure for mobility and periodic registration update with Follow-on request indicator set to "Follow-on request pending", except for:

- emergency services;

- high priority access;

- indicating a change of 3GPP PS data off UE status;

- sending an SOR transparent container;

- sending a UE policy container; or

- sending a UE parameters update transparent container;

iii) shall not initiate a service request procedure or request the lower layers to resume a suspended connection, except for:

- emergency services;

- emergency services fallback;

- high priority access;

- responding to paging;

- responding to notification received over non-3GPP access;

- indicating a change of 3GPP PS data off UE status;

- sending an SOR transparent container;

- sending a UE policy container; or

- sending a UE parameters update transparent container; and

2) if the UE is in 5GMM-CONNECTED mode or 5GMM-CONNECTED mode with RRC inactive indication over 3GPP access, the UE:

i) shall not perform the registration procedure for mobility and periodic registration update with Uplink data status IE except for emergency services or for high priority access;

ii) shall not initiate a service request procedure except for:

- emergency services;

- emergency services fallback;

- high priority access;

- responding to paging or responding to notification received over non-3GPP access;

iii) shall not initiate a 5GSM procedure except for:

- emergency services;

- high priority access; or

- indicating a change of 3GPP PS data off UE status; and

iv) shall not perform the NAS transport procedure except for the sending:

- SMS;

- an LPP message;

- a location services message;

- an SOR transparent container;

- a UE policy container;

- a UE parameters update transparent container; or

- a CIoT user data container.

NOTE 1: The contents of CIoT user data container can be data that is not for exception reports, or data that is for exception reports if allowed for the UE (see subclause 6.2.13).

If the UE is successfully registered to a PLMN and has a stored list of "non-allowed tracking areas":

a) while camped on a cell which is in the registered PLMN or a PLMN from the list of equivalent PLMNs and whose TAI is not in the list of "non-allowed tracking areas" or on a satellite NG-RAN access cell not all TAIs of the cell are in the list of "non-allowed tracking areas", the UE shall stay in, or enter, the state 5GMM-REGISTERED.NORMAL-SERVICE and is allowed to initiate any 5GMM and 5GSM procedures; and

b) while camped on a cell whose TAI is in the list of "non-allowed tracking areas" or on a satellite NG-RAN cell all TAIs of the cell are in the list of "non-allowed tracking areas", the UE shall enter the state 5GMM-REGISTERED.NON-ALLOWED-SERVICE, and:

1) if the UE is in 5GMM-IDLE mode or 5GMM-IDLE mode with suspend indication over 3GPP access, the UE:

i) shall not include the Uplink data status IE in the registration procedure for mobility and periodic registration update except for emergency services or for high priority access;

ii) shall not perform the registration procedure for mobility and periodic registration update with Follow-on request indicator set to "Follow-on request pending", except for:

- emergency services;

- high priority access;

- indicating a change of 3GPP PS data off UE status;

- sending an SOR transparent container;

- sending a UE policy container; or

- sending a UE parameters update transparent container; and

iii) shall not initiate a service request procedure or request the lower layers to resume a suspended connection, except for:

- emergency services;

- emergency services fallback;

- high priority access;

- responding to paging;

- responding to notification received over non-3GPP access;

- indicating a change of 3GPP PS data off UE status;

- sending an SOR transparent container;

- sending a UE policy container; or

- sending a UE parameters update transparent container; and

2) if the UE is in 5GMM-CONNECTED mode or 5GMM-CONNECTED mode with RRC inactive indication over 3GPP access, the UE:

i) shall not perform the registration procedure for mobility and registration update with the Uplink data status IE except for emergency services or for high priority access;

ii) shall not initiate a service request procedure or request the lower layers to resume a suspended connection, except for:

- emergency services;

- emergency services fallback;

- high priority access; or

- responding to paging or responding to notification received over non-3GPP access;

iii) shall not initiate a 5GSM procedure except for:

- emergency services;

- high priority access; or

- indicating a change of 3GPP PS data off UE status; and

iv) shall not perform the NAS transport procedure except for the sending:

- SMS;

- an LPP message;

- a location services message;

- an SOR transparent container;

- a UE policy container;

- a UE parameters update transparent container; or

- a CIoT user data container.

NOTE 2: The contents of CIoT user data container can be data that is not for exception reports, or data that is for exception reports if allowed for the UE (see subclause 6.2.13).

The list of "allowed tracking areas", as well as the list of "non-allowed tracking areas" shall be erased when:

a) the UE is switched off; and

b) the UICC containing the USIM is removed or an entry of the "list of subscriber data" with the SNPN identity of the SNPN is updated.

When a tracking area is added to the list of "5GS forbidden tracking areas for roaming" or to the list of "5GS forbidden tracking areas for regional provision of service" as specified in the subclauses 5.5.1.2.5 or 5.5.1.3.5, the tracking area shall be removed from the list of "allowed tracking areas" if the tracking area is already present in the list of "allowed tracking areas" and from the list of "non-allowed tracking areas" if the tracking area is already present in the list of "non-allowed tracking areas".

*\*\*\* end of change \*\*\**