**3GPP TSG-CT WG1 Meeting #123C1-202801**

**Electronic meeting, 16-24 April 2020**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
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|  | **24.501** | **CR** | **1379** | **rev** | **6** | **Current version:** | **16.4.1** |  |
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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 | **X** |

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| ***Title:***  | Corrections on the abnormal cases of registration procedure for initial registration |
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| ***Source to WG:*** | Huawei, HiSilicon |
| ***Source to TSG:*** | C1 |
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| ***Work item code:*** | 5GProtoc16 |  | ***Date:*** | 2020-04-01 |
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| ***Category:*** | **F** |  | ***Release:*** | Rel-16 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)Rel-12 (Release 12)**Rel-13 (Release 13)Rel-14 (Release 14)Rel-15 (Release 15)Rel-16 (Release 16)* |
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| ***Reason for change:*** | Case h) of abnormal cases in the UE of registration procedure for initial registration basically copy the handling in the EPS." *h) Change of cell into a new tracking area.* *If a cell change into a new tracking area occurs before the registration procedure for initial registration is completed, the registration procedure for initial registration shall be aborted and re-initiated immediately. If the REGISTRATION COMPLETE message needs to be sent and a tracking area border is crossed when* *the REGISTRATION ACCEPT message has been received but before a REGISTRATION COMPLETE message is sent, the registration procedure for initial registration shall be re-initiated. If a 5G-GUTI was allocated during the registration procedure, this 5G-GUTI shall be used in the registration procedure.* "However, registration procedure for initial registration is different from the attach procedure, as REGISTRATION COMPLETE message is an optional message to acknowledge some parameters are received or updated. And the registration procedure for initial registration is more complex than the registration procedure for mobility registration update. Hence, in case of the REGISTRATION COMPLETE message needs to be sent and a tracking area border is crossed when the REGISTRATION ACCEPT message has been received but before a REGISTRATION COMPLETE message is sent, if the REGISTRATION ACCEPT message includes the SOR transparent container IE and the SOR transparent container IE successfully passes the integrity check, the registration procedure for initial registration shall be re-initiated, in order to re-obtain the SOR information. Otherwise, the registration procedure for initial registration shall be aborted and the registration procedure for mobility registration update shall be initiated. It is unnecessary to re-initiate the initial registration just for mobility when the REGISTRATION ACCEPT message has been received.Thus, it is proposed to modify the case h) in the UE.Accordingly, the case g) of abnormal cases on the network side for initial registration also basically copy the handling in the EPS." *g)* *REGISTRATION REQUEST message with 5GS registration type IE set to "mobility registration updating" or "periodic registration updating" received before REGISTRATION COMPLETE message, if the REGISTRATION COMPLETE message is expected.* *Timer T3550 shall be stopped. The allocated 5G-GUTI in the registration procedure for initial registration shall be considered as valid and the registration procedure for mobility and periodic update shall be rejected with the 5GMM cause #10 "implicitly de-registered" as described in subclause 5.5.1.3.5."*This abnormal case on the network side corresponds to the abnormal case described above. Therefore, the network should process it as normal mobility registration, which is same to the handling in the 2G/3G.Excerpts from 3GPP TS 24.008:" *f) ROUTING AREA UPDATE REQUEST message received before ATTACH COMPLETE message.* *Timer T3350 shall be stopped. The allocated P-TMSI shall be considered as valid and the routing area updating procedure shall be progressed as described in subclause 4.7.5."*Thus, it is proposed to modify the case g) on the network side.**Update for Rev5:**If the new tracking area is in the TAI list, the UE should handle it as normal.**Update for Rev6:**SoR check is removed.Case i) should be changed same as case h). |
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| ***Summary of change:*** | * Abnormal case h) in the UE is modified to clarify: (1) If the REGISTRATION ACCEPT message includes the SOR transparent container IE and the SOR transparent container IE successfully passes the integrity check, the registration procedure for initial registration shall be re-initiated, in order to re-obtain the SOR information. (2) Otherwise, the registration procedure for initial registration shall be aborted and the registration procedure for mobility registration update shall be initiated.
* Abnormal case g) on the network side is modified to clarify the network shall process the REGISTRATION REQUEST message as normal mobility registration accordingly.

**Update for Rev5:**If the new tracking area is in the TAI list, the UE sends a REGISTRATION COMPLETE message to the network as normal.**Update for Rev6:**Case i) should be changed same as case h).SoR check is removed. |
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| ***Consequences if not approved:*** | Upon change of cell into a new tracking area before a REGISTRATION COMPLETE message is sent, the UE would re-initiate the registration procedure for initial registration, which is unnecessary. |
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| ***Clauses affected:*** | 5.5.1.2.7, 5.5.1.2.8 |
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|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
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| ***Other comments:*** |  |
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| ***This CR's revision history:*** | Rev#2 is the resubmisstion of Rev#1 C1-196048 which was not opened in CT1#120 due to lack of time.Rev#3 and #4 are handled in CT1#121 meeting but postponed. |

\* \* \* First Change \* \* \* \*

##### 5.5.1.2.7 Abnormal cases in the UE

The following abnormal cases can be identified:

a) Timer T3346 is running.

 The UE shall not start the registration procedure for initial registration unless:

1) the UE is a UE configured for high priority access in selected PLMN;

2) the UE needs to perform the registration procedure for initial registration for emergency services;

3) the UE receives a DEREGISTRATION REQUEST message with the "re-registration required" indication; or

4) the UE in NB-N1 mode is requested by the upper layer 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] or the USIM file EFNASCONFIG in 3GPP TS 31.102 [22]); and

- timer T3346 was not started when N1 NAS signalling connection was established with RRC establishment cause set to "mo-ExceptionData".

 The UE stays in the current serving cell and applies the normal cell reselection process.

NOTE 1: It is considered an abnormal case if the UE needs to initiate a registration procedure for initial registration while timer T3346 is running independent on whether timer T3346 was started due to an abnormal case or a non-successful case.

b) The lower layers indicate that the access attempt is barred.

 The UE shall not start the initial registration procedure. The UE stays in the current serving cell and applies the normal cell reselection process. Receipt of the access barred indication shall not trigger the selection of a different core network type (EPC or 5GCN).

 The initial registration procedure is started, if still needed, when the lower layers indicate that the barring is alleviated for the access category with which the access attempt was associated.

ba) The lower layers indicate that access barring is applicable for all access categories except categories 0 and 2 and the access category with which the access attempt was associated is other than 0 and 2.

 If the REGISTRATION REQUEST message has not been sent, the UE shall proceed as specified for case b. If the REGISTRATION REQUEST message has been sent, the UE shall proceed as specified for case e and, additionally, the registration procedure for initial registration is started, if still needed, when the lower layers indicate that the barring is alleviated for the access category with which the access attempt was associated.

c) T3510 timeout.

 The UE shall abort the registration procedure for initial registration and the NAS signalling connection, if any, shall be released locally if the initial registration request is not for emergency services. The UE shall proceed as described below.

d) REGISTRATION REJECT message, other 5GMM cause values than those treated in subclause 5.5.1.2.5, and cases of 5GMM cause values #11, #22, #31, #72, #73, #74, #75, #76 and #77, if considered as abnormal cases according to subclause 5.5.1.2.5.

 If the registration request is not an initial registration request for emergency services, upon reception of the 5GMM causes #95, #96, #97, #99 and #111 the UE should set the registration attempt counter to 5.

 The UE shall proceed as described below.

e) Lower layer failure or release of the NAS signalling connection received from lower layers before the REGISTRATION ACCEPT or REGISTRATION REJECT message is received.

 The UE shall abort the registration procedure for initial registration and proceed as described below.

f) UE initiated de-registration required.

 The registration procedure for initial registration shall be aborted, and the UE initiated de-registration procedure shall be performed.

g) De-registration procedure collision.

 If the UE receives a DEREGISTRATION REQUEST message from the network in state 5GMM-REGISTERED-INITIATED the de-registration procedure shall be aborted and the initial registration procedure shall be progressed.

NOTE 2: The above collision case is valid if the DEREGISTRATION REQUEST message indicates the access type over which the initial registration procedure is attempted otherwise both the procedures are progressed.

h) Change of cell into a new tracking area.

 If a cell change into a new tracking area occurs before the registration procedure for initial registration is completed, the registration procedure for initial registration shall be aborted and re-initiated immediately.

 If the REGISTRATION COMPLETE message needs to be sent and a tracking area border is crossed when the REGISTRATION ACCEPT message has been received but before a REGISTRATION COMPLETE message is sent and:

1) if the new tracking area is in the TAI list, the UE sends the REGISTRATION COMPLETE message to the network; and

2) otherwise, the registration procedure for initial registration shall be aborted and the registration procedure for mobility registration update shall be initiated.

 If a 5G-GUTI was allocated during the registration procedure, this 5G-GUTI shall be used in the registration procedure.

i) Transmission failure of REGISTRATION COMPLETE message indication with TAI change from lower layers.

1) If the current TAI is still part of the TAI list, the UE resends the REGISTRATION COMPLETE message to the network; and

2) otherwise, the registration procedure for initial registration shall be aborted and the registration procedure for mobility registration update shall be initiated.

j) Transmission failure of REGISTRATION COMPLETE message indication without TAI change from lower layers.

 It is up to the UE implementation how to re-run the ongoing procedure.

k) Transmission failure of REGISTRATION REQUEST message indication from the lower layers.

 The registration procedure for initial registration shall be aborted and re-initiated immediately.

l) Timer T3447 is running.

 The UE shall not start the registration procedure for initial registration with Follow-on request indicator set to "Follow-on request pending" unless:

1) the UE is a UE configured for high priority access in selected PLMN; or

2) the UE needs to perform the registration procedure for initial registration for emergency services.

 The UE stays in the current serving cell and applies the normal cell reselection process. The registration procedure for initial registration is started, if still necessary, when timer T3447 expires.

For the cases c, d and e, the UE shall proceed as follows:

 Timer T3510 shall be stopped if still running.

 If the registration procedure is neither an initial registration for emergency services nor for establishing an emergency PDU session with registration type not set to "emergency registration", the registration attempt counter shall be incremented, unless it was already set to 5.

 If the registration attempt counter is less than 5:

- if the initial registration request is not for emergency services, timer T3511 is started and the state is changed to 5GMM-DEREGISTERED.ATTEMPTING-REGISTRATION. When timer T3511 expires the registration procedure for initial registration shall be restarted, if still required.

 If the registration attempt counter is equal to 5

- the UE shall delete 5G-GUTI, TAI list, last visited registered TAI, list of equivalent PLMNs (if any), and ngKSI, start timer T3502 and shall set the 5GS update status to 5U2 NOT UPDATED. The state is changed to 5GMM-DEREGISTERED.ATTEMPTING-REGISTRATION or optionally to 5GMM-DEREGISTERED.PLMN-SEARCH in order to perform a PLMN selection or SNPN selection according to 3GPP TS 23.122 [5].

- if the procedure is performed via 3GPP access and the UE is operating in single-registration mode:

- the UE shall in addition handle the EMM parameters EPS update status, EMM state, 4G-GUTI, TAI list, last visited registered TAI, list of equivalent PLMNs and eKSI as specified in 3GPP TS 24.301 [15] for the abnormal cases when an EPS attach procedure fails and the attach attempt counter is equal to 5; and

- the UE shall attempt to select E-UTRAN radio access technology and proceed with appropriate EMM specific procedures. Additionally, The UE may disable the N1 mode capability as specified in subclause 4.9.

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

##### 5.5.1.2.8 Abnormal cases on the network side

The following abnormal cases can be identified:

a) Lower layer failure

 If a lower layer failure occurs before the REGISTRATION COMPLETE message has been received from the UE and timer T3550 is running, the AMF shall locally abort the registration procedure for initial registration, enter state 5GMM-REGISTERED and shall not resend the REGISTRATION ACCEPT message. If a new 5G-GUTI was assigned to the UE in the registration procedure for initial registration, the AMF shall consider both the old and the new 5G-GUTI as valid until the old 5G-GUTI can be considered as invalid by the AMF or the 5GMM context which has been marked as deregistered in the AMF is released. If the old 5G-GUTI was allocated by an AMF other than the current AMF, the current AMF does not need to retain the old 5G-GUTI. During this period the network may use the identification procedure followed by a generic UE configuration update procedure if the old 5G-GUTI is used by the UE in a subsequent message.

b) Protocol error

 If the REGISTRATION REQUEST message is received with a protocol error, the AMF shall return a REGISTRATION REJECT message with one of the following 5GMM cause values:

#96 invalid mandatory information;

#99 information element non-existent or not implemented;

#100 conditional IE error; or

#111 protocol error, unspecified.

c) T3550 time-out

 On the first expiry of the timer, the AMF shall retransmit the REGISTRATION ACCEPT message and shall reset and restart timer T3550.

 This retransmission is repeated four times, i.e. on the fifth expiry of timer T3550, the registration procedure for initial registration shall be aborted and the AMF enters state 5GMM-REGISTERED. If a new 5G-GUTI was allocated in the REGISTRATION ACCEPT message, the AMF shall consider both the old and the new 5G-GUTIs as valid until the old 5G-GUTI can be considered as invalid by the AMF or the 5GMM context which has been marked as de-registered in the AMF is released. If the old 5G-GUTI was allocated by an AMF other than the current AMF, the current AMF does not need to retain the old 5G-GUTI. During this period, if the old 5G-GUTI is used by the UE in a subsequent message, the AMF acts as specified for case a) above.

d) REGISTRATION REQUEST message received after the REGISTRATION ACCEPT message has been sent and before the REGISTRATION COMPLETE message is received, if the REGISTRATION COMPLETE message is expected.

1) If one or more of the information elements in the REGISTRATION REQUEST message differ from the ones received within the previous REGISTRATION REQUEST message, the previously initiated the registration procedure for initial registration shall be aborted if the REGISTRATION COMPLETE message has not been received and the new registration procedure for initial registration shall be progressed; or

2) if the information elements do not differ, then the REGISTRATION ACCEPT message shall be resent and the timer T3550 shall be restarted. In that case, the retransmission counter related to T3550 is not incremented.

e) More than one REGISTRATION REQUEST message with 5GS registration type IE set to "initial registration" received and no REGISTRATION ACCEPT or REGISTRATION REJECT message has been sent.

1) If one or more of the information elements in the REGISTRATION REQUEST message with 5GS registration type IE set to "initial registration" differs from the ones received within the previous REGISTRATION REQUEST message with 5GS registration type IE set to "initial registration", the previously initiated the registration procedure for initial registration shall be aborted and the new the registration procedure for initial registration shall be executed;

2) if the information elements do not differ, then the network shall continue with the previous the registration procedure for initial registration and shall ignore the second REGISTRATION REQUEST message.

f) REGISTRATION REQUEST message with 5GS registration type IE set to "initial registration" received in state 5GMM-REGISTERED.

 If a REGISTRATION REQUEST message with 5GS registration type IE set to "initial registration" is received in state 5GMM-REGISTERED the network may initiate the 5GMM common procedures; if it turned out that the REGISTRATION REQUEST message was sent by a genuine UE that has already been registered, the 5GMM context, if any, are deleted and the new REGISTRATION REQUEST is progressed.

NOTE 1: The network can determine that the UE is genuine by executing the authentication procedure as described in subclause 5.4.1.

g) REGISTRATION REQUEST message with 5GS registration type IE set to "mobility registration updating" or "periodic registration updating" received before REGISTRATION COMPLETE message, if the REGISTRATION COMPLETE message is expected.

 Timer T3550 shall be stopped. The allocated 5G-GUTI in the registration procedure for initial registration shall be considered as valid and the registration procedure for mobility and periodic update shall be progressed as described in subclause 5.5.1.3.

h) DEREGISTRATION REQUEST message received before REGISTRATION COMPLETE message, if the REGISTRATION COMPLETE message is expected.

 The AMF shall abort the registration procedure for initial registration and shall progress the de-registration procedure as described in subclause 5.5.2.2.

i) UE security capabilities invalid or unacceptable

 If the REGISTRATION REQUEST message is received with invalid or unacceptable UE security capabilities (e.g. no 5GS encryption algorithms (all bits zero), no 5GS integrity algorithms (all bits zero), mandatory 5GS encryption algorithms not supported or mandatory 5GS integrity algorithms not supported, etc.), the AMF shall return a REGISTRATION REJECT message.

NOTE 2: 5GMM cause value to be used in REGISTRATION REJECT message is up to the network implementation.

j) Based on operator policy, if the initial registration request is rejected due to UE not supporting of CAG feature, the UE is allowed to access 5GS via CAG cells only and the initial registration is not for emergency services, the network shall reject the initial registration with a 5GMM cause value other than the 5GMM cause #76 (Not authorized for this CAG or authorized for CAG cells only).

NOTE 3: 5GMM case #7 (5GS services not allowed), 5GMM case #11 (PLMN not allowed), 5GMM cause #27 (N1 mode not allowed), 5GMM case #73 (Serving network not authorized) can be used depending on subscription of the UE and whether the UE roams or not.

\* \* \* End of Change \* \* \* \*