**3GPP TSG-CT WG1 Meeting #137-eC1-224827**

**E-Meeting, 18th – 26th August 2022**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **24.501** | **CR** | **4545** | **rev** | **-** | **Current version:** | **17.7.1** |  |
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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 UE handling when returning to coverage in 5GS | | | | | | | | | |
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| ***Source to WG:*** | vivo | | | | | | | | | |
| ***Source to TSG:*** | C1 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | 5GProtoc18 | | | | |  | ***Date:*** | | | 2022-08-05 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***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 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-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
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| ***Reason for change:*** | | TS 23.501 specifies the behaviour of the UE in RM-REGISTERED state enters CM-IDLE state after the expiry of the periodic registration timer as below:  *Whenever a UE in RM-REGISTERED state enters CM-IDLE state, it starts a periodic registration timer according to the periodic registration timer value received from the AMF during a Registration procedure.*  *The AMF allocates a periodic registration timer value to the UE based on local policies, subscription information and information provided by the UE. After the expiry of the periodic registration timer, the UE shall perform a periodic registration. If the UE moves out of network coverage when its periodic registration timer expires, the UE shall perform a Registration procedure when it next returns to the coverage.*  According to current CT1 specification, the UE enters the 5GMM-REGISTERED.NO-CELL-AVAILABLE state if the 5G coverage has been lost. The UE shall perform cell selection and choose an appropriate substate when a cell is found. At this moment, the periodic registration timer expires, the periodic registration procedure is delayed until it is next returns to the coverage. The above UE’s behaviour shall be captured in the CT1 specification. | | | | | | | | |
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| ***Summary of change:*** | | If the UE in RM-REGISTERED state moves out of network coverage when its periodic registration timer expires, the UE shall perform the periodic registration procedure when it next returns to the coverage. | | | | | | | | |
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| ***Consequences if not approved:*** | | The stage 2 requirement is not implemented and the UE behavior is undetermined. The UE can not use services timely when it returns to 5G coverage, which degrades the user experience. | | | | | | | | |
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| ***Clauses affected:*** | | 5.3.7 | | | | | | | | |
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|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  |  | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  |  | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  |  | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

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

### 5.3.7 Handling of the periodic registration update timer and mobile reachable timer

The periodic registration update procedure is used over 3GPP access to periodically notify the availability of the UE to the network. The procedure is controlled in the UE by the periodic registration update timer, T3512.

If the UE is registered over the 3GPP access, the AMF maintains an implicit de-registration timer to control when the UE is considered implicitly de-registered over the 3GPP access. If the UE is registered over the non-3GPP access, the AMF also maintains a non-3GPP implicit de-registration timer to control when the UE is considered implicitly de-registered over the non-3GPP access. The UE registered over the non-3GPP access maintains a non-3GPP de-registration timer to control when the UE is considered implicitly de-registered for the non-3GPP access.

The AMF shall start a non-3GPP implicit de-registration timer for the UE registered over non-3GPP access when the N1 NAS signalling connection over non-3GPP access is released.

The UE registered over non-3GPP access shall reset and start a non-3GPP de-registration timer when the N1 NAS signalling connection over non-3GPP access is released. The non-3GPP de-registration timer is stopped when the UE enters 5GMM-CONNECTED mode over non-3GPP access or the 5GMM-DEREGISTERED state over non-3GPP access.

The non-3GPP implicit de-registration timer shall be longer than the non-3GPP de-registration timer.

The value of timer T3512 is sent by the network to the UE in the REGISTRATION ACCEPT message. The UE shall apply this value in all tracking areas of the list of tracking areas assigned to the UE until a new value is received. The periodic registration update timer only applies to the UE registered to the 5GS services over 3GPP access.

If timer T3512 received by the UE in a REGISTRATION ACCEPT message contains an indication that the timer is deactivated or the timer value is zero, then timer T3512 is deactivated and the UE shall not perform the periodic registration update procedure.

NOTE 1: The UE does not perform the periodic registration update procedure for non-3GPP access.

If during the registration procedure, the AMF does not indicate "strictly periodic registration timer supported" in the MICO indication IE to the UE, timer T3512 is reset and started with its initial value, when the UE changes from 5GMM-CONNECTED over 3GPP access to 5GMM-IDLE mode over 3GPP access. Timer T3512 is stopped when the UE enters 5GMM-CONNECTED mode over 3GPP access or the 5GMM-DEREGISTERED state over 3GPP access.

If during the registration procedure, the AMF indicates "strictly periodic registration timer supported" in the MICO indication IE to the UE, timer T3512 is started with its initial value after the completion of the registration procedure. The UE shall neither stop nor reset the timer T3512 when the UE enters 5GMM-CONNECTED or when changing from 5GMM-CONNECTED mode to 5GMM-IDLE mode. If the timer T3512 expires,

a) the UE in 5GMM-CONNECTED mode over 3GPP access shall reset and start the timer T3512 with its initial value; or

b) the UE in 5GMM-IDLE mode over 3GPP access shall perform the periodic registration procedure.

If the UE is registered for emergency services, and timer T3512 expires, the UE shall not initiate a periodic registration update procedure, but shall locally de-register from the network. When the UE is camping on a suitable cell, it may re-register to regain normal service.

When a UE is not registered for emergency services, and timer T3512 expires when the UE is in 5GMM-IDLE mode, the periodic registration update procedure shall be started.

If the UE is not registered for emergency services, and is in a state other than 5GMM-REGISTERED.NORMAL-SERVICE or 5GMM-REGISTERED.NON-ALLOWED-SERVICE over 3GPP access when timer T3512 expires, the periodic registration update procedure is delayed until the UE returns to 5GMM-REGISTERED.NORMAL-SERVICE or 5GMM-REGISTERED.NON-ALLOWED-SERVICE over 3GPP access.

If the UE is not registered for emergency services and moves out of the network coverage when timer T3512 expires, the periodic registration update procedure is delayed until the UE next returns to the network coverage.

NOTE 2: When the UE returns to 5GMM-REGISTERED.NORMAL-SERVICE or 5GMM-REGISTERED.NON-ALLOWED-SERVICE and it needs to initiate other 5GMM procedure than the periodic registration update procedure then, based on UE implementation, the 5GMM procedure can take precedence.

The network supervises the periodic registration update procedure of the UE by means of the mobile reachable timer.

If the UE is not registered for emergency services, the mobile reachable timer shall be longer than the value of timer T3512. In this case, by default, the mobile reachable timer is 4 minutes greater than the value of timer T3512.

The network behaviour upon expiry of the mobile reachable timer is network dependent, but typically the network stops sending paging messages to the UE on the first expiry, and may take other appropriate actions.

If the UE is registered for emergency services, the AMF shall set the mobile reachable timer with a value equal to timer T3512. When the mobile reachable timer expires, the AMF shall locally de-register the UE.

The mobile reachable timer shall be reset and started with the value as indicated above, when the AMF releases the NAS signalling connection for the UE. The mobile reachable timer shall be stopped when a NAS signalling connection is established for the UE.

Upon expiry of the mobile reachable timer the network shall start the implicit de-registration timer over 3GPP access. The value of the implicit de-registration timer over 3GPP access is network dependent. If MICO mode is activated, the network shall start the implicit de-registration timer over 3GPP access when the UE enters 5GMM-IDLE mode at the AMF over 3GPP access. The default value of the implicit de-registration timer over 3GPP access is 4 minutes greater than the value of timer T3512.

If the implicit de-registration timer expires before the UE contacts the network, the network shall implicitly de-register the UE. The implicit de-registration timer shall be stopped when a NAS signalling connection is established for the UE.

If the non-3GPP implicit de-registration timer expires before the UE contacts the network over the non-3GPP access, the network shall implicitly de-register the UE and enter the state 5GMM-DEREGISTERED over non-3GPP access for the UE. The non-3GPP implicit de-registration timer shall be stopped when a NAS signalling connection over non-3GPP access is established for the UE.

If the non-3GPP de-registration timer expires before the UE contacts the network over the non-3GPP access, the UE shall enter the state 5GMM-DEREGISTERED over non-3GPP access. The non-3GPP de-registration timer shall be stopped when a NAS signalling connection over non-3GPP access is established for the UE.

If the AMF provides T3346 value IE in the DEREGISTRATION REQUEST message with Access type set to "Non-3GPP access" in Deregistration type IE, REGISTRATION REJECT message during a registration procedure for mobility and periodic registration update or SERVICE REJECT message and the value of timer T3346 is greater than the value of timer T3512, the AMF sets the mobile reachable timer and the implicit de-registration timer such that the sum of the timer values is greater than the value of timer T3346.

If the AMF provides T3346 value IE in the DEREGISTRATION REQUEST message with Access type set to "3GPP access" in Deregistration type IE, REGISTRATION REJECT message during a registration procedure for mobility and periodic registration update or SERVICE REJECT message and the value of timer T3346 is greater than the value of the non-3GPP de-registration timer, the AMF sets the non-3GPP implicit de-registration timer value to be 8 minutes greater than the value of timer T3346.

If the UE receives T3346 value IE in the DEREGISTRATION REQUEST message with Access type set to "3GPP access" in Deregistration type IE, REGISTRATION REJECT message during a registration procedure for mobility and periodic registration update or SERVICE REJECT message and the value of timer T3346 is greater than the value of the non-3GPP de-registration timer, the UE sets the non-3GPP de-registration timer value to be 4 minutes greater than the value of timer T3346.

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