**3GPP TSG-CT WG1 Meeting #123-eC1-202635**

**Electronic meeting, 16-24 April 2020 (was C1-202278)**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
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|  | **24.501** | **CR** | **1803** | **rev** | **3** | **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 |  |

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|  |
| ***Title:***  | Add handling for UE configured to use timer T3245 in 5GS via 3GPP access |
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| ***Source to WG:*** | Qualcomm Incorporated, Ericsson |
| ***Source to TSG:*** | C1 |
|  |  |
| ***Work item code:*** | 5GProtoc16 |  | ***Date:*** | 2020-04-20 |
|  |  |  |  |  |
| ***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:*** | In both EPS and GPRS, if the UE is configured to use timer T3245, then the UE can recover from permanent NAS failures (such as adding the PLMN to the list of forbidden PLMNs or invalidating the USIM) within 12 to 24 hours without any user intervention. This feature is very useful for MTC devices. Also, DoS behavior associated with timer T3247 is disabled when the UE is configured to use timer T3245. Currently, there is an editor’s note that is not resolved yet about considering such handling of T3245 timer in 5GS. We should note that if the UE is a multi-mode device that supports 5GS with EPS and/or GPRS and is configured to use timer T3245, then the UE can enable GPRS services which include 5GS services at expiry of timer T3245 based on defined behavior in TS 24.301 and/or TS 24.008. |
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| ***Summary of change:*** | Resolve an editor’s note in subclause 5.3.20.1 by adding behavior associated with UE configured to use timer T3245 in 5GS similar to behavior defined in EPS and GPRS. |
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| ***Consequences if not approved:*** | Some 5GS enabled UEs cannot recover from NAS permanent failures by configuring these UEs to use timer T3245 while corresponding EPS and GPRS enabled UEs can recover. |
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| ***Clauses affected:*** | 5.3.19a (new), 5.3.20.1, 10.2 |
|  |  |
|  | **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:*** |  |

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

### 5.3.19a Specific requirements for UE configured to use timer T3245

The following requirements apply for a UE that is configured to use timer T3245 (see 3GPP TS 24.368 [17] or 3GPP TS 31.102 [22]):

When the UE adds a PLMN identity to the "forbidden PLMN list" or sets the USIM as invalid for 5GS services for 3GPP access or non-3GPP access, and timer T3245 (see 3GPP TS 24.008 [12]) is not running, the UE shall start timer T3245 as specified in 3GPP TS 24.008 [12], subclause 4.1.1.6.

Upon expiry of the timer T3245, the UE shall erase the "forbidden PLMN list" and "forbidden PLMNs for GPRS service" list and set the USIM to valid for 5GS services for 3GPP access and non-3GPP access. When the lists are erased, the UE performs cell selection according to 3GPP TS 38.304 [28].

If the UE is switched off when the timer T3245 is running, the UE shall behave as follows when the UE is switched on and the USIM in the UE remains the same:

- let t1 be the time remaining for T3245 timeout at switch off and let t be the time elapsed between switch off and switch on. If t1 is greater than t, then the timer shall be restarted with the value t1 – t. If t1 is equal to or less than t, then the UE will follow the behaviour as defined in the paragraph above upon expiry of the timer T3245. If the UE is not capable of determining t, then the UE shall restart the timer with the value t1.

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

### 5.3.20 Specific requirements for UE when receiving non-integrity protected reject messages

#### 5.3.20.1 General

This subclause specifies the requirements for a UE that is not configured to use timer T3245 (see 3GPP TS 24.368 [17] or 3GPP TS 31.102 [22]) and receives a REGISTRATION REJECT or SERVICE REJECT message without integrity protection with specific 5GMM causes.

NOTE: Additional UE requirements for this case, requirements for other 5GMM causes, and requirements for the case when the UE receives an integrity protected reject message are specified in subclauses 5.5.1 and 5.6.1.

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

## 10.2 Timers of 5GS mobility management

Timers of 5GS mobility management are shown in table 10.2.1 and table 10.2.2

NOTE: Timers T3346 and T3245 are defined in 3GPP TS 24.008 [12]. Timers T3444, T3445, T3447 and T3448 are defined in 3GPP TS 24.301 [15].

Table 10.2.1: Timers of 5GS mobility management – UE side

| TIMER NUM. | TIMER VALUE | STATE | CAUSE OF START | NORMAL STOP | ON EXPIRY |
| --- | --- | --- | --- | --- | --- |
| T3502 | Default 12 min.NOTE 1 | 5GMM-DEREGISTERED 5GMM-REGISTERED | At registration failure and the attempt counter is equal to 5 | Transmission of REGISTRATION REQUEST message | Initiation of the registration procedure, if still required |
| T3510 | 15sNOTE 7NOTE 8In WB-N1/CE mode, 85s | 5GMM-REGISTERED-INITIATED | Transmission of REGISTRATION REQUEST message | REGISTRATION ACCEPT message received or REGISTRATION REJECT message received | Start T3511 or T3502 as specified in subclause 5.5.1.2.7 if T3510 expired during registration procedure for initial registration.Start T3511 or T3502 as specified in subclause 5.5.1.3.7 if T3510 expired during the registration procedure for mobility and periodic registration update |
| T3511 | 10s | 5GMM-DEREGISTERED.ATTEMPTING-REGISTRATION5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE5GMM-REGISTERED.NORMAL-SERVICE | At registration failure due to lower layer failure, T3510 timeout or registration rejected with other 5GMM cause values than those treated in subclause 5.5.1.2.5 for initial registration or subclause 5.5.1.3.5 for mobility and periodic registration | Transmission of REGISTRATION REQUEST message5GMM-CONNECTED mode entered (NOTE 5) | Retransmission of the REGISTRATION REQUEST, if still required |
| T3512 | Default 54 minNOTE 1NOTE 2 | 5GMM-REGISTERED | In 5GMM-REGISTERED, when 5GMM-CONNECTED mode is left and if the NW does not indicate support for strictly periodic registration timer as specified in subclause 5.3.7.If the network indicates support for strictly periodic registration timer, T3512 is started after the successful completion of registration update procedure. T3512 is restarted if it expires in 5GMM-CONNECTED mode as specified in subclause 5.3.7. | When entering state 5GMM-DEREGISTERED When entering 5GMM-CONNECTED mode if the NW does not indicate support for strictly periodic registration timer as specified in subclause 5.3.7. | In 5GMM-IDLE mode, Initiation of the periodic registration procedure if the UE is not registered for emergency services.In 5GMM-CONNECTED mode, restart the timer T3512.Locally deregister if the UE is registered for emergency services |
| T3516 | 30sNOTE 7NOTE 8In WB-N1/CE mode, 48s | 5GMM-REGISTERED-INITIATED5GMM-REGISTERED5GMM-DEREGISTERED-INITIATED5GMM-SERVICE-REQUEST-INITIATED | RAND and RES\* stored as a result of an 5G authentication challenge | SECURITY MODE COMMAND receivedSERVICE REJECT receivedREGISTRATION ACCEPT receivedAUTHENTICATION REJECT receivedAUTHENTICATION FAILURE sent5GMM-DEREGISTERED, 5GMM-NULL or5GMM-IDLE mode entered | Delete the stored RAND and RES\* |
| T3517 | 15sNOTE 7NOTE 8 In WB-N1/CE mode, 61s | 5GMM-SERVICE-REQUEST-INITIATED | Transmission of SERVICE REQUEST message | (a) Indication from the lower layers that the UE has changed to S1 mode or E-UTRA connected to 5GCN for case h) in subclause 5.6.1.1; or(b) SERVICE ACCEPT message received, orSERVICE REJECT message received for cases other than h) in subclause 5.6.1.1 | Abort the procedure |
| T3519 | 60sNOTE 7NOTE 8 In WB-N1/CE mode, 90s | 5GMM-REGISTERED-INITIATED5GMM-REGISTERED5GMM-DEREGISTERED-INITIATED5GMM-SERVICE-REQUEST-INITIATED (NOTE 6) | Transmission of IDENTITY RESPONSE message, REGISTRATION REQUEST message, or DEREGISTRATION REQUEST message with freshly generated SUCI | REGISTRATION ACCEPT message with new 5G-GUTI receivedCONFIGURATION UPDATE COMMAND message with new 5G-GUTI received DEREGISTRATION ACCEPT message | Delete stored SUCI |
| T3520 | 15sNOTE 7NOTE 8In WB-N1/CE mode, 33s | 5GMM-REGISTERED-INITIATED5GMM-REGISTERED5GMM-DEREGISTERED-INITIATED5GMM-SERVICE-REQUEST-INITIATED | Transmission of AUTHENTICATION FAILURE message with any of the 5GMM cause #20, #21, #26 or #71Transmission of AUTHENTICATION RESPONSE message with an EAP-response message after detection of an error as described in subclause 5.4.1.2.2.4 | AUTHENTICATION REQUEST message received or AUTHENTICATION REJECT message receivedorSECURITY MODE COMMAND message receivedwhen entering 5GMM-IDLE modeindication of transmission failure of AUTHENTICATION FAILURE message from lower layers | On first expiry during a 5G AKA based primary authentication and key agreement procedure, the UE should consider the network as false and follow item g of subclause 5.4.1.3.7, if the UE is not registered for emergency services.On first expiry during a 5G AKA based primary authentication and key agreement procedure, the UE will follow subclause 5.4.1.3.7 under "For items c, d, e and f:", if the UE is registered for emergency services.On first expiry during an EAP based primary authentication and key agreement procedure, the UE should consider the network as false and follow item e of subclause 5.4.1.2.4.5, if the UE is not registered for emergency services.On first expiry during an EAP based primary authentication and key agreement procedure, the UE will follow subclause 5.4.1.2.4.5 under "For item e:", if the UE is registered for emergency services |
| T3521 | 15sNOTE 7NOTE 8In WB-N1/CE mode, 45s | 5GMM-DEREGISTERED-INITIATED | Transmission of DEREGISTRATION REQUEST message when de-registration procedure is not due to a "switch off" | DEREGISTRATION ACCEPT message received | Retransmission of DEREGISTRATION REQUEST message |
| T3525 | Default 60sNOTE 3NOTE 7NOTE 8In WB-N1/CE mode, default 120s | 5GMM-REGISTERED.NORMAL-SERVICE | T3517 expires and service request attempt counter is greater than or equal to 5 | When entering state other than 5GMM-REGISTERED.NORMAL-SERVICE state,orUE camped on a new PLMN other than the PLMN on which timer started,orUser-plane resources established with the network | The UE may initiate service request procedure |
| T3540 | 10s | 5GMM-DEREGISTERED5GMM-REGISTERED | REGISTRATION REJECT message or DEREGISTRATION REQUEST message received with any of the 5GMM cause #3, #6, #7, #11, #12, #13, #15, #27, #31, #62, #72, #73, #74, #75 or #76SERVICE REJECT message received with any of the 5GMM cause #3, #6, #7, #11, #12, #13, #15, #27, #72, #73, #74, #75 or #76.REGISTRATION ACCEPT message received as described in subclause 5.3.1.3 case b)SERVICE ACCEPT message received as described in subclause 5.3.1.3 case f)AUTHENTICATION REJECT message received | N1 NAS signalling connection releasedPDU sessions have been set up | Release the NAS signalling connection for the cases a), b), f) and g) as described in subclause 5.3.1.3 |
| 5GMM-REGISTERED | CONFIGURATION UPDATE COMMAND message received as described in subclause 5.3.1.3 case e) | N1 NAS signalling connection released | Release the NAS signalling connection for the case e) and perform a new registration procedure as described in subclause 5.5.1.3.2 |
| 5GMM-DEREGISTERED5GMM-DEREGISTERED.NORMAL-SERVICE5GMM-REGISTERED.NON-ALLOWED-SERVICE | REGISTRATION REJECT message received with the 5GMM cause #9 or #10SERVICE REJECT message received with the 5GMM cause #9, #10 or #28 | Release the NAS signalling connection for the cases c) and d) as described in subclause 5.3.1.3 and initiation of the registration procedure as specified in subclause 5.5.1.2.2 or 5.5.1.3.2 |
| Non-3GPP de-registration timer | Default 54 min.NOTE 1NOTE 2NOTE 4 | All 5GMM state over non-3GPP access except 5GMM-DEREGISTERED over non-3GPP access | Entering 5GMM-IDLE mode over non-3GPP access | N1 NAS signalling connection over non-3GPP access established or when entering state 5GMM-DEREGISTERED over non-3GPP access | Implicitly de-register the UE for non-3GPP access on 1st expiry |
| NOTE 1: The value of this timer is provided by the network operator during the registration procedure.NOTE 2: The default value of this timer is used if the network does not indicate a value in the REGISTRATION ACCEPT message and the UE does not have a stored value for this timer.NOTE 3: The value of this timer is UE implementation specific, with a minimum value of 60 seconds if not in NB-N1 mode and if not in WB-N1/CE mode.NOTE 4: If the T3346 value received in the mobility management messages 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.NOTE 5: The conditions for which this applies are described in subclause 5.5.1.3.7.NOTE 6: The conditions for which this applies to the 5GMM-SERVICE-REQUEST-INITIATED state are described in subclause 5.4.1.3.7 case c) and case d).NOTE 7: In NB-N1 mode, the timer value shall be calculated as described in subclause 4.17.NOTE 8: In WB-N1 mode, if the UE supports CE mode B and operates in either CE mode A or CE mode B, then the timer value is as described in this table for the case of WB-N1/CE mode (see subclause 4.19). |

Table 10.2.2: Timers of 5GS mobility management – AMF side

| TIMER NUM. | TIMER VALUE | STATE | CAUSE OF START | NORMAL STOP | ON EXPIRY |
| --- | --- | --- | --- | --- | --- |
| T3513NOTE 7 NOTE 9 | NOTE 4 | 5GMM-REGISTERED | Paging procedure initiated | Paging procedure completed as specified in subclause 5.6.2.2.1 | Network dependent |
| T3522NOTE 6NOTE 8 | 6sIn WB-N1/CE mode, 24s | 5GMM-DEREGISTERED-INITIATED | Transmission of DEREGISTRATION REQUEST message | DEREGISTRATION ACCEPT message received | Retransmission of DEREGISTRATION REQUEST message |
| T3550NOTE 6NOTE 8 | 6sIn WB-N1/CE mode, 18s | 5GMM-COMMON-PROCEDURE-INITIATED | Transmission of REGISTRATION ACCEPT message with 5G-GUTI, SOR transparent container IE, the Extended emergency number list IE, UE radio capability ID IE, UE radio capability ID deletion indication IE, Operator-defined access category definitions IE, Network slicing subscription changed indication, or new configured NSSAI and optionally new mapped S-NSSAI(s) | REGISTRATION COMPLETE message received | Retransmission of REGISTRATION ACCEPT message |
| T3555NOTE 6NOTE 8 | 6sIn WB-N1/CE mode, 24s | 5GMM-REGISTERED | Transmission of CONFIGURATION UPDATE COMMAND message with "acknowledgement requested" set in the Acknowldgement bit of the Configuration update indication IE | CONFIGURATION UPDATE COMPLETE message received | Retransmission of CONFIGURATION UPDATE COMMAND message |
| T3560NOTE 6NOTE 8 | 6sIn WB-N1/CE mode, 24s | 5GMM-COMMON-PROCEDURE-INITIATED | Transmission of AUTHENTICATION REQUEST messageTransmission of SECURITY MODE COMMAND message | AUTHENTICATION RESPONSE message receivedAUTHENTICATION FAILURE message receivedSECURITY MODE COMPLETE message receivedSECURITY MODE REJECT message received | Retransmission of AUTHENTICATION REQUEST message or SECURITY MODE COMMAND message |
| T3565NOTE 6NOTE 8 | 6sIn WB-N1/CE mode, 24s | 5GMM-REGISTERED | Transmission of NOTIFICATION message | SERVICE REQUEST message receivedNOTIFICATION RESPONSE message receivedREGISTRATION REQUESTMessage receivedDEREGISTRATION REQUEST message received | Retransmission of NOTIFICATION message |
| T3570NOTE 6NOTE 8 | 6sIn WB-N1/CE mode, 24s | 5GMM-COMMON-PROCEDURE-INITIATED | Transmission of IDENTITY REQUEST message | IDENTITY RESPONSE message received | Retransmission of IDENTITY REQUEST message |
| T3575 | 15s | 5GMM-REGISTERED | Transmission of NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND message | NETWORK SLICE-SPECIFIC AUTHENTICATION COMPLETE message received | Retransmission of NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND message |
| Active timer | TBD | All except 5GMM-DEREGISTERED | Entering 5GMM-IDLE mode after indicating MICO mode activation to the UE with an active timer value. | N1 NAS signallingconnection established | Activate MICO mode for the UE. |
| Implicit de-registration timer | NOTE 2 | All except 5GMM-DEREGISTERED | The mobile reachable timer expires while the network is in 5GMM-IDLE modeEntering 5GMM-IDLE mode over 3GPP access if the MICO mode is activated and strictly periodic monitoring timer is not runningThe strictly periodic monitoring timer expires while the network is in 5GMM-IDLE mode | N1 NAS signalling connection established | Implicitly de-register the UE on 1st expiry |
| Mobile reachable timer | NOTE 1  | All except 5GMM-DEREGISTERED | Entering 5GMM-IDLE mode | N1 NAS signalling connection established | Network dependent, but typically paging is halted on 1st expiry, and start implicit de-registration timer, if the UE is not registered for emergency services.Implicitly de-register the UE which is registered for emergency services |
| Non-3GPP implicit de-registration timer | NOTE 3 | All except 5GMM-DEREGISTERED | Entering 5GMM-IDLE mode over non-3GPP access | N1 NAS signalling connection over non-3GPP access established | Implicitly de-register the UE for non-3GPP access on 1s expiry |
| Strictly periodic monitoring timer | NOTE 5 | All except 5GMM-DEREGISTERED | At the successful completion of registration update procedure if strictly periodic registration timer indication is supported as specified in subclause 5.3.7. | Entering 5GMM-DEREGISTERED. | In 5GMM-IDLE mode, start implicit de-registration timer as specified in subclause 5.3.7.In 5GMM-CONNECTED mode, Strictly periodic monitoring timer is started again as specified in subclause 5.3.7. |
| NOTE 1: The default value of this timer is 4 minutes greater than the value of timer T3512. If the UE is registered for emergency services, the value of this timer is set equal to the value of timer T3512. If the T3346 value provided in the mobility management messages is greater than the value of the 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.NOTE 2: The value of this timer is network dependent. If MICO is activated, the default value of this timer is 4 minutes greater than the value of timer T3512.NOTE 3: The value of this timer is network dependent. The default value of this timer is 4 minutes greater than the non-3GPP de-registration timer. If the T3346 value provided in the mobility management messages 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.NOTE 4: The value of this timer is network dependent.NOTE 5: The value of this timer is the same as the value of timer T3512.NOTE 6: In NB-N1 mode, the timer value shall be calculated as described in subclause 4.17.NOTE 7: In NB-N1 mode, the timer value shall be calculated by using an NAS timer value which is network dependent.NOTE 8: In WB-N1 mode, if the UE supports CE mode B and operates in either CE mode A or CE mode B, then the timer value is as described in this table for the case of WB-N1/CE mode (see subclause 4.19).NOTE 9: In WB-N1 mode, if the UE supports CE mode B, then the timer value shall be calculated by using an NAS timer value which value is network dependent. |

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