**3GPP TSG-CT WG1 Meeting #132-eC1-21XXXX**

**E-meeting, 11-15 October 2021**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **24.301** | **CR** | **3547** | **rev** | **3** | **Current version:** | **17.4.1** |  |
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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 |  | Radio Access Network |  | Core Network | **X** |

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| ***Title:*** | Negotiated IMSI offset assigned and lower layer failure before TAU COMPLETE is received by network | | | | | | | | | |
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| ***Source to WG:*** | Mediatek Inc., Ericsson(?), Intel(?) | | | | | | | | | |
| ***Source to TSG:*** | C1 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | MUSIM | | | | |  | ***Date:*** | | | 2021/10/12 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***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:*** | | In 5.5.3.2.4 Normal and periodic tracking area updating procedure accepted by the network  *…If the TRACKING AREA UPDATE ACCEPT message contained a GUTI or a Negotiated IMSI offset IE, the UE shall return a TRACKING AREA UPDATE COMPLETE message to the MME to acknowledge the received GUTI or the received Negotiated IMSI offset IE*.*…*  Lower layer failure can happen before the *TRACKING AREA UPDATE COMPLETE* is received by MME and this may cause NW cannot exactly know which (alternative) IMSI value is currently used by the UE, hence it is necessary to define how to handle it. | | | | | | | | |
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| ***Summary of change:*** | | Specify that the NW need to consider two different (alternative) IMSI values when calculating paging occasion when the lower layer failure happens before the TRACKING AREA UPDATE COMPLETE is received | | | | | | | | |
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| ***Consequences if not approved:*** | | UE and NW may have different understanding on the value of the **IMSI offset** value (used to **calculated alternative IMSI** to derive paging occasion timing), hence paging miss happens. | | | | | | | | |
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| ***Clauses affected:*** | | 5.5.3.2.7 | | | | | | | | |
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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:*** | |  | | | | | | | | |

\*\*\* change \*\*\*

##### 5.5.3.2.7 Abnormal cases on the network side

The following abnormal cases can be identified:

a) If a lower layer failure occurs before the message TRACKING AREA UPDATE COMPLETE has been received from the UE:

- the network shall abort the procedure and enter EMM-IDLE mode;

- if a GUTI has been assigned:

- the network shall consider both, the old and new GUTI as valid until the old GUTI can be considered as invalid by the network (see clause 5.4.1.4 and 5.4.1.6). During this period the network may use the identification procedure followed by a GUTI reallocation procedure if the old GUTI is used by the UE in a subsequent message. The network may page with IMSI if paging with old and new S-TMSI fails. Paging with IMSI causes the UE to re-attach as described in clause 5.6.2.2.2; and

- if in the TRACKING AREA UPDATE ACCEPT message:

1) a different negotiated IMSI offset value has been assigned to a UE that previously had a negotiated IMSI offset value assigned;

2) no negotiated IMSI offset value has been assigned to a UE that previously had a negotiated IMSI offset value assigned; or

3) a negotiated IMSI offset value has been assigned to a UE that previously had no negotiated IMSI offset value assigned;

for case 1) the network shall consider two alternative IMSI values valid and for case 2) and 3) the network shall consider one alternative IMSI value and the IMSI value valid until one of the two (alternative) IMSI values can be considered as invalid by the network.

NOTE X: The network can consider an (alternative) IMSI value as invalid if, e.g., the UE responds to paging when the network pages the UE only using the other (alternative) IMSI.

b) Protocol error

If the TRACKING AREA UPDATE REQUEST message has been received with a protocol error, the network shall return a TRACKING AREA UPDATE REJECT message with one of the following EMM cause values:

#96: invalid mandatory information element error;

#99: information element non-existent or not implemented;

#100: conditional IE error; or

#111: protocol error, unspecified.

c) T3450 time-out

On the first expiry of the timer, the network shall retransmit the TRACKING AREA UPDATE ACCEPT message and shall reset and restart timer T3450. The retransmission is performed four times, i.e. on the fifth expiry of timer T3450, the tracking area updating procedure is aborted. Both, the old and the new GUTI shall be considered as valid until the old GUTI can be considered as invalid by the network (see clause 5.4.1.4). During this period the network acts as described for case a above.

d) TRACKING AREA UPDATE REQUEST received after the TRACKING AREA UPDATE ACCEPT message has been sent and before the TRACKING AREA UPDATE COMPLETE message is received

- If one or more of the information elements in the TRACKING AREA UPDATE REQUEST message differ from the ones received within the previous TRACKING AREA UPDATE REQUEST message, the previously initiated tracking area updating procedure shall be aborted if the TRACKING AREA UPDATE COMPLETE message has not been received and the new tracking area updating procedure shall be progressed; or

- If the information elements do not differ for cases other than inter-system change from N1 mode to S1 mode in EMM-IDLE mode with the UE operating in the single-registration mode, then the TRACKING AREA UPDATE ACCEPT message shall be resent and the timer T3450 shall be restarted if a TRACKING AREA UPDATE COMPLETE message is expected. If the information elements do not differ for the case of inter-system change from N1 mode to S1 mode in EMM-IDLE mode with the UE operating in the single-registration mode, the MME should forward the new TRACKING AREA UPDATE REQUEST message which contains the same information elements as the previous TRACKING AREA UPDATE REQUEST message to the source AMF to run the integrity check, obtain the latest mapped EPS security context (to be used to protect any future NAS message sent to the UE) and continue with the new tracking area updating procedure. In these cases, the retransmission counter related to T3450 is not incremented.

NOTE 1: Instead of forwarding the new TRACKING AREA UPDATE REQUEST message which contains the same information elements to the source AMF, the MME can decide to initiate an authentication procedure followed by a security mode control procedure to take the new partial native EPS security context into use if the new partial native EPS security context is taken into use successfully, then resend the same TRACKING AREA UPDATE ACCEPT message protected using this new EPS security context.

e) More than one TRACKING AREA UPDATE REQUEST received and no TRACKING AREA UPDATE ACCEPT or TRACKING AREA UPDATE REJECT message has been sent

- If one or more of the information elements in the TRACKING AREA UPDATE REQUEST message differs from the ones received within the previous TRACKING AREA UPDATE REQUEST message, the previously initiated tracking area updating procedure shall be aborted and the new tracking area updating procedure shall be progressed;

- if the information elements do not differ for cases other than inter-system change from N1 mode to S1 mode in EMM-IDLE mode with the UE operating in the single-registration mode, then the network shall continue with the previous tracking area updating procedure and shall not treat any further this TRACKING AREA UPDATE REQUEST message. If the information elements do not differ for the case of inter-system change from N1 mode to S1 mode in EMM-IDLE mode with the UE operating in the single-registration mode, the MME should forward the new TRACKING AREA UPDATE REQUEST message which contains the same information elements as the previous TRACKING AREA UPDATE REQUEST message to the source AMF to run the integrity check, obtain the latest mapped EPS security context (to be used to protect any future NAS message sent to the UE) and continue with the previous tracking area updating procedure.

NOTE 2: Instead of forwarding the new TRACKING AREA UPDATE REQUEST message which contains the same information elements to the source AMF, the MME can decide to initiate an authentication procedure followed by a security mode control procedure to take the new partial native EPS security context into use and, if the new partial native EPS security context is taken into use successfully, use this new EPS security context to protect any future NAS message sent to the UE.

f) Lower layers indication of non-delivered NAS PDU due to handover

If the TRACKING AREA UPDATE ACCEPT message or TRACKING AREA UPDATE REJECT message could not be delivered due to an intra MME handover and the TAI of the target cell and the TAI of the source cell are the same, then upon successful completion of the intra MME handover the MME shall retransmit the TRACKING AREA UPDATE ACCEPT message or TRACKING AREA UPDATE REJECT message. If a failure of the handover procedure is reported by the lower layer and the S1 signalling connection exists, the MME shall retransmit the TRACKING AREA UPDATE ACCEPT message or TRACKING AREA UPDATE REJECT message.

g) DETACH REQUEST message received before the TRACKING AREA UPDATE ACCEPT message is sent or before the TRACKING AREA UPDATE COMPLETE message (in case of GUTI and/or TMSI was allocated) is received.

Detach containing cause "switch off":

The network shall abort the signalling for the tracking area updating procedure towards the UE and shall progress the detach procedure as described in clause 5.5.2.2.

NOTE 3: Internally in the network, before processing the detach request, the MME can perform the necessary signalling procedures for the tracking area updating procedure before progressing the detach procedure.

Detach containing other causes than "switch off":

The network shall proceed with the tracking area updating procedure and shall progress the detach procedure after successful completion of the tracking area updating procedure.

h) If the TRACKING AREA UPDATE REQUEST message with EPS update type IE indicating "periodic updating" is received by the new MME which does not have the EMM context data related to the subscription, the new MME may send the TRACKING AREA UPDATE REJECT message with EMM cause value #10 "Implicitly detached"

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