**3GPP TSG-CT WG1 Meeting #133-bis-eC1-220349**

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

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **24.301** | **CR** | **3665** | **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 | **X** | ME |  | Radio Access Network |  | Core Network | **X** |

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| ***Title:*** | Clarification on the paging information for Multi-USIM UE in EPS | | | | | | | | | |
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| ***Source to WG:*** | vivo | | | | | | | | | |
| ***Source to TSG:*** | C1 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | MUSIM | | | | |  | ***Date:*** | | | 2022-1-4 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***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)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | 1. LS from RAN2 (R2-2111330) specifies that the information available in the paging message includes voice service and non-voice service. Current specification in TS 24.301 only supports the voice service indication as the information available in the paging message. To align with the RAN2 specification, "voice service indication" shall be populated with “voice service indication or non-voice service indication”. 2. The Multi-USIM UE is allowed to not respond to paging based on the information available in the paging message. Add the description in TS 24.301. | | | | | | | | |
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| ***Summary of change:*** | | 1. Add the non-voice service indication as the information available in the paging message. 2. Add the notes which specify the Multi-USIM UE is allowed to not respond to paging based on the information available in the paging message. | | | | | | | | |
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| ***Consequences if not approved:*** | | The UE may miss non-voice service. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 5.2.3.2.1, 5.2.3.2.2, 5.2.3.2.3, 5.2.3.2.5, 5.2.3.2.7, 5.5.3.2.2, 5.5.3.3.2, 5.6.1.1, 5.6.2.2.1.1 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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 \* \* \*

##### 5.2.3.2.1 NORMAL-SERVICE

The UE:

- shall initiate normal and combined tracking area updating (according to conditions given in clause 5.5.3);

- shall perform periodic tracking area updating (see clause 5.5.3) except when attached for emergency bearer services (see clause 5.3.5);

- shall initiate a tracking area updating on the expiry of timer T3411;

- shall respond to paging; and

NOTE 1: As an implementation option, the Multi-USIM UE is allowed to not respond to paging based on the paging cause indication.

- if configured for eCall only mode as specified in 3GPP TS 31.102 [17], shall perform the eCall inactivity procedure at expiry of timer T3444 or T3445 (see clause 5.5.4).

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

##### 5.2.3.2.2 ATTEMPTING-TO-UPDATE

The UE:

- shall not send any user data;

- shall initiate tracking area updating on the expiry of timers T3411, T3402 or T3346;

- shall initiate tracking area updating 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 one of the forbidden PLMN lists, and the tracking area is not in one of the lists of forbidden tracking areas;

- shall initiate tracking area updating 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 and the tracking area is not in one of the lists of forbidden tracking areas;

- may initiate a tracking area updating procedure upon request of the upper layers to establish a PDN connection for emergency bearer services;

- shall initiate tracking area updating procedure upon request of the upper layers to establish a PDN connection without the NAS signalling low priority indication as specified in clause 5.5.3.2.6, item l), if timer T3346 is running due to a NAS request message (TRACKING AREA UPDATE REQUEST, CONTROL PLANE SERVICE REQUEST or EXTENDED SERVICE REQUEST) which contained the low priority indicator set to "MS is configured for NAS signalling low priority" and timer T3402 and timer T3411 are not running;

- may detach locally and initiate an attach for emergency bearer services even if timer T3346 is running;

- shall use requests for non-EPS services from CM layers to trigger a combined tracking area updating procedure, if timer T3346 is not running (see clause 5.5.3.3), or to attempt to select GERAN, UTRAN or cdma2000® 1xRTT radio access technology and proceed with the appropriate MM and CC specific procedures;

- may use requests for an MMTEL voice call or MMTEL video call from the upper layers to initiate tracking area updating, if timer T3346 is not running;

- shall initiate tracking area updating when the UE performs inter-system change from N1 mode to S1 mode, even if timer T3402 is running;

- shall initiate tracking area updating in response to paging with S-TMSI or paging with IMSI and domain indicator set to ″CS″;

NOTE 1: As an implementation option, the Multi-USIM UE is allowed to not respond to paging based on the paging cause indication.

- shall initiate tracking area updating if the EPS update status is set to EU2 NOT UPDATED, and timers T3411, T3402 and T3346 are not running;

- if configured for eCall only mode as specified in 3GPP TS 31.102 [17], shall perform the eCall inactivity procedure at expiry of timer T3444 or T3445 (see clause 5.5.4);

- may initiate tracking area updating 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 [15A]) if timer T3346 is not already running for "MO exception data" and even if timer T3402 or timer T3411 is running; and

- shall not initiate the detach signalling procedure unless the current TAI is part of the TAI list.

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

##### 5.2.3.2.3 LIMITED-SERVICE

The UE:

- shall perform cell selection/reselection according to 3GPP TS 36.304 [21];

- may respond to paging (with IMSI);

NOTE 1: As an implementation option, the Multi-USIM UE is allowed to not respond to paging based on the paging cause indication.

- may detach locally and initiate attach for emergency bearer services;

- may detach locally and may initiate attach for access to RLOS; and

- if configured for eCall only mode as specified in 3GPP TS 31.102 [17], shall perform the eCall inactivity procedure at expiry of timer T3444 or T3445 (see clause 5.5.4).

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

##### 5.2.3.2.5 UPDATE-NEEDED

The UE:

- shall not send any user data;

- shall not send signalling information, unless it is a service request a tracking area updating or combined tracking area updating procedure which is triggered:

a) as a response to paging;

NOTE 1: As an implementation option, the Multi-USIM UE is allowed to not respond to paging based on the paging cause indication.

b) upon request by the upper layers to establish a PDN connection for emergency bearer services; or

c) upon a request from the upper layers for an MMTEL voice call, MMTEL video call, SMSoIP, SMS over NAS or SMS over S102;

- shall perform cell selection/reselection according to 3GPP TS 36.304 [21];

- shall enter the appropriate new substate as soon as the access is allowed in the selected cell for one of the access classes of the UE; and

- if configured for eCall only mode as specified in 3GPP TS 31.102 [17], shall perform the eCall inactivity procedure at expiry of timer T3444 or T3445 (see clause 5.5.4).

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

##### 5.2.3.2.7 ATTEMPTING-TO-UPDATE-MM

The UE:

- shall perform cell selection/reselection according to 3GPP TS 36.304 [21];

- shall be able to receive and transmit user data and signalling information;

- shall initiate combined tracking area updating procedure indicating "combined TA/LA updating with IMSI attach" on the expiry of timers T3411 or T3402 or when the UE enters a tracking area not in the list of registered tracking areas and not in one of the lists of forbidden tracking areas;

- shall respond to paging with IMSI or S-TMSI for the PS domain;

NOTE 1: As an implementation option, the Multi-USIM UE is allowed to not respond to paging based on the paging cause indication.

- shall use requests for non-EPS services from CM layers to attempt to select GERAN or UTRAN radio access technology and proceed with the appropriate MM and CC specific procedures, unless T3402 is running due to receipt of an ATTACH ACCEPT or TRACKING AREA UPDATING ACCEPT message with EMM cause #22 "congestion";

- shall use requests for non-EPS services due to emergency call from CM layers to attempt to select GERAN or UTRAN radio access technology and proceed with the appropriate MM and CC specific procedures, even if T3402 is running due to receipt of an ATTACH ACCEPT or TRACKING AREA UPDATING ACCEPT message with EMM cause #22 "congestion"; and

- if configured for eCall only mode as specified in 3GPP TS 31.102 [17], shall perform the eCall inactivity procedure at expiry of timer T3444 or T3445 (see clause 5.5.4).

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

##### 5.5.3.2.2 Normal and periodic tracking area updating procedure initiation

The UE in state EMM-REGISTERED shall initiate the tracking area updating procedure by sending a TRACKING AREA UPDATE REQUEST message to the MME,

a) when the UE detects entering a tracking area that is not in the list of tracking areas that the UE previously registered in the MME, unless the UE is configured for "AttachWithIMSI" as specified in 3GPP TS 24.368 [15A] or 3GPP TS 31.102 [17] and is entering a tracking area in a new PLMN that is neither the registered PLMN nor in the list of equivalent PLMNs;

b) when the periodic tracking area updating timer T3412 expires;

c) when the UE enters EMM-REGISTERED.NORMAL-SERVICE and the UE's TIN indicates "P-TMSI";

d) when the UE performs an inter-system change from S101 mode to S1 mode and has no user data pending;

e) when the UE receives an indication from the lower layers that the RRC connection was released with cause "load balancing TAU required";

f) when the UE deactivated EPS bearer context(s) locally while in EMM-REGISTERED, because it could not establish a NAS signalling connection, and then returns to EMM-REGISTERED.NORMAL-SERVICE and no EXTENDED SERVICE REQUEST message, CONTROL PLANE SERVICE REQUEST message or DETACH REQUEST message with detach type is "EPS detach" or "combined EPS/IMSI detach" is pending to be sent by the UE;

g) when the UE changes any one of the UE network capability information, the MS network capability information or the N1 UE network capability information;

h) when the UE changes the UE specific DRX parameter (in WB-S1 mode or NB-S1 mode);

i) when the UE receives an indication of "RRC Connection failure" from the lower layers and has no signalling or user uplink data pending (i.e. when the lower layer requests NAS signalling connection recovery);

j) when the UE enters S1 mode after 1xCS fallback or 1xSRVCC;

k) when due to manual CSG selection the UE has selected a CSG cell whose CSG identity and associated PLMN identity are not included in the UE's Allowed CSG list or in the UE's Operator CSG list;

l) when the UE reselects an E-UTRAN cell while it was in GPRS READY state or PMM-CONNECTED mode;

m) when the UE supports SRVCC to GERAN or UTRAN or supports vSRVCC to UTRAN and changes the mobile station classmark 2 or the supported codecs, or the UE supports SRVCC to GERAN and changes the mobile station classmark 3;

n) when the UE changes the radio capability for GERAN, or cdma2000® or both;

o) when the UE's usage setting or the voice domain preference for E-UTRAN change in the UE;

NOTE 1: For the change of UE's usage setting or the voice domain preference for E-UTRAN which results in disabling UE's E-UTRA capability, the UE can skip sending TRACKING AREA UPDATE REQUEST message and directly perform disabling of UE's E-UTRA capability.

p) when the UE activates mobility management for IMS voice termination as specified in 3GPP TS 24.008 [13], annex P.2, and the TIN indicates "RAT-related TMSI";

q) when the UE performs an inter-system change from A/Gb mode to S1 mode and the TIN indicates "RAT-related TMSI", but the UE is required to perform tracking area updating for IMS voice termination as specified in 3GPP TS 24.008 [13], annex P.4;

r) upon reception of a paging indication using S-TMSI and the UE is in state EMM-REGISTERED.ATTEMPTING-TO-UPDATE;

NOTE 2: As an implementation option, the Multi-USIM UE is allowed to not respond to paging based on the paging cause indication.s) when the UE needs to update the network with EPS bearer context status due to local de-activation of EPS bearer context(s) as specified in clause 6.5.1.4A;

t) when the UE needs to request the use of PSM or needs to stop the use of PSM;

u) when the UE needs to request the use of eDRX or needs to stop the use of eDRX;

v) when a change in the eDRX usage conditions at the UE requires different extended DRX parameters;

w) when a change in the PSM usage conditions at the UE requires a different timer T3412 value or different timer T3324 value;

NOTE 3: A change in the PSM or eDRX usage conditions at the UE can include e.g. a change in the UE configuration, a change in requirements from upper layers or the battery running low at the UE.

x) when the CIoT EPS optimizations the UE needs to use, change in the UE;

y) when the Default\_DCN\_ID value changes, as specified in 3GPP TS 24.368 [15A] or in USIM file NASCONFIG as specified in 3GPP TS 31.102 [17];

NOTE 4: The tracking area updating procedure is initiated after deleting the DCN-ID list as specified in annex C.

z) when the UE performs inter-system change from N1 mode to S1 mode in EMM-IDLE mode, the UE operates in single-registration mode, and conditions specified in 3GPP TS 24.501 [54] apply;

za) when the UE in EMM-IDLE mode changes the radio capability for E-UTRAN;

zb) when the UE needs to request new ciphering keys for ciphered broadcast assistance data;

zc) when the UE in EMM-IDLE mode changes the radio capability for NG-RAN;

zd) when the UE performs inter-system change from N1 mode to S1 mode in EMM-CONNECTED mode;

ze) in WB-S1 mode, when the applicable UE radio capability ID for the current UE radio configuration changes due to a revocation of the network-assigned UE radio capability IDs by the serving PLMN;

zf) when the UE needs to use the WUS assistance, stop to use the WUS assistance, or change the conditions for using the WUS assistance; or

zg) when the MUSIM capable UE needs to request an IMSI Offset value as specified in 3GPP TS 23.401 [10] that is used for deriving the paging occasion as specified in 3GPP TS 36.304 [21].

If case b) is the only reason for initiating the normal and periodic tracking area updating procedure, the UE shall indicate "periodic updating" in the EPS update type IE; otherwise the UE shall indicate "TA updating".

For cases n, za and zc, the UE shall include a UE radio capability information update needed IE in the TRACKING AREA UPDATE REQUEST message.

If the UE is in the EMM-CONNECTED mode and the UE changes the radio capability for E-UTRAN or for NG-RAN, the UE may locally release the established NAS signalling connection and enter the EMM-IDLE mode. Then, the UE shall initiate the tracking area updating procedure including a UE radio capability information update needed IE in the TRACKING AREA UPDATE REQUEST message.

For case l, if the TIN indicates "RAT-related TMSI", the UE shall set the TIN to "P-TMSI" before initiating the tracking area updating procedure.

For case r, the "active" flag in the EPS update type IE shall be set to 1. If a UE is only using EPS services with control plane CIoT EPS optimization, the "signalling active" flag in the Additional update type IE shall be set to 1.

If the UE is using only control plane CIoT EPS optimization, the case i only applies to the case that the UE has indicated to the network that subsequent to the uplink data transmission a downlink data transmission is expected during the transport of uplink user data via the control plane procedure (see clause 6.6.4).

If the UE has to request resources for ProSe direct discovery or Prose direct communication (see 3GPP TS 36.331 [22]), then the UE shall set the "active" flag to 1 in the TRACKING AREA UPDATE REQUEST message.

If the UE does not have any established PDN connection, and the inter-system change from N1 mode to S1 mode is not due to emergency services fallback, the "active" flag in the EPS update type IE shall be set to 0.

When the UE has user data pending and performs an inter-system change from S101 mode to S1 mode to a tracking area included in the TAI list stored in the UE, the UE shall perform a service request procedure instead of a tracking area updating procedure.

When initiating a tracking area updating procedure while in S1 mode, the UE shall use the current EPS NAS integrity key to integrity protect the TRACKING AREA UPDATE REQUEST message, unless the UE is performing inter-system change from N1 mode to S1 mode.

In order to indicate its UE specific DRX parameter for WB-S1 mode while in E-UTRAN coverage, the UE shall send the TRACKING AREA UPDATE REQUEST message containing the UE specific DRX parameter in the DRX parameter IE to the network, with the exception of the case if the UE had indicated its DRX parameter for WB-S1 mode (3GPP TS 24.008 [13]) to the network while in GERAN or UTRAN coverage. In this case, when the UE enters E-UTRAN coverage and initiates a tracking area updating procedure, the UE shall not include the UE specific DRX parameter in the DRX parameter IE in the TRACKING AREA UPDATE REQUEST message.

In NB-S1 mode, a UE that wishes to use or change a UE specific DRX parameter in NB-S1 mode shall include its requested value in every TRACKING AREA UPDATE REQUEST message except when initiating the periodic tracking area updating procedure.

If the UE supports eDRX and requests the use of eDRX, the UE shall include the extended DRX parameters IE in the TRACKING AREA UPDATE REQUEST message.

If the UE supports PSM and requests the use of PSM, the UE shall include the T3324 value IE with a requested timer value in the TRACKING AREA UPDATE REQUEST message. When the UE includes the T3324 value IE and the UE indicates support for extended periodic timer value in the MS network feature support IE, it may also include the T3412 extended value IE to request a particular T3412 value to be allocated.

If a UE supporting CIoT EPS optimizations in NB-S1 mode initiates the tracking area updating procedure for EPS services and "SMS only", the UE shall indicate "SMS only" in the Additional update type IE and shall set the EPS update type IE to "TA updating".

If the UE supports S1-U data transfer and multiple user plane radio bearers (see 3GPP TS 36.306 [44], 3GPP TS 36.331 [22]) in NB-S1 mode, then the UE shall set the Multiple DRB support bit to "Multiple DRB supported" in the UE network capability IE of the TRACKING AREA UPDATE REQUEST message.

If the UE is in NB-S1 mode, then the UE shall set the Control plane CIoT EPS optimization bit to "Control plane CIoT EPS optimization supported" in the UE network capability IE of the TRACKING AREA UPDATE REQUEST message. If the UE is capable of NB-N1 mode, then the UE shall set the Control plane CIoT 5GS optimization bit to "Control plane CIoT 5GS optimization supported" in the N1 UE network capability IE of the TRACKING AREA UPDATE REQUEST message.

If the UE supports control plane MT-EDT, then the UE shall set the CP-MT-EDT bit to "Control plane Mobile Terminated-Early Data Transmission supported" in the UE network capability IE of the TRACKING AREA UPDATE REQUEST message.

If the UE supports user plane MT-EDT, then the UE shall set the UP-MT-EDT bit to "User plane Mobile Terminated-Early Data Transmission supported" in the UE network capability IE of the TRACKING AREA UPDATE REQUEST message.

If the UE supports EPS-UPIP, the UE shall set the EPS-UPIP bit to "EPS-UPIP supported" in the UE network capability IE of the TRACKING AREA UPDATE REQUEST message.

If the UE has to request resources for V2X communication over PC5 (see 3GPP TS 23.285 [47]), then the UE shall set the "active" flag to 1 in the TRACKING AREA UPDATE REQUEST message.

After sending the TRACKING AREA UPDATE REQUEST message to the MME, the UE shall start timer T3430 and enter state EMM-TRACKING-AREA-UPDATING-INITIATED (see example in figure 5.5.3.2.2.1). If timer T3402 is currently running, the UE shall stop timer T3402. If timer T3411 is currently running, the UE shall stop timer T3411. If timer T3442 is currently running, the UE shall stop timer T3442.

For all cases except cases z and zd:

1) if the UE supports neither A/Gb mode nor Iu mode, the UE shall include a valid GUTI in the Old GUTI IE in the TRACKING AREA UPDATE REQUEST message. In addition, the UE shall include Old GUTI type IE with GUTI type set to "native GUTI"; or

2) if the UE supports A/Gb mode or Iu mode or both, the UE shall handle the Old GUTI IE as follows:

- If the TIN indicates "P-TMSI" and the UE holds a valid P-TMSI and RAI, the UE shall map the P-TMSI and RAI into the Old GUTI IE, and include Old GUTI type IE with GUTI type set to "mapped GUTI". If a P-TMSI signature is associated with the P-TMSI, the UE shall include it in the Old P-TMSI signature IE. Additionally, if the UE holds a valid GUTI, the UE shall indicate the GUTI in the Additional GUTI IE.

NOTE 5: The mapping of the P-TMSI and RAI to the GUTI is specified in 3GPP TS 23.003 [2].

- If the TIN indicates "GUTI" or "RAT-related TMSI" and the UE holds a valid GUTI, the UE shall indicate the GUTI in the Old GUTI IE, and include Old GUTI type IE with GUTI type set to "native GUTI".

If a UE has established PDN connection(s) and uplink user data pending to be sent via user plane when it initiates the tracking area updating procedure, or uplink signalling not related to the tracking area updating procedure when the UE does not support control plane CIoT EPS optimization, it may set the "active" flag in the TRACKING AREA UPDATE REQUEST message to indicate the request to establish the user plane to the network and to keep the NAS signalling connection after the completion of the tracking area updating procedure.

If a UE is using EPS services with control plane CIoT EPS optimization and has user data pending to be sent via control plane over MME but no user data pending to be sent via user plane, or uplink signalling not related to the tracking area updating procedure, the UE may set the "signalling active" flag in the TRACKING AREA UPDATE REQUEST message to indicate the request to keep the NAS signalling connection after the completion of the tracking area updating procedure.

For all cases except cases z and zd, if the UE has a current EPS security context, the UE shall include the eKSI (either KSIASME or KSISGSN) in the NAS Key Set Identifier IE in the TRACKING AREA UPDATE REQUEST message. Otherwise, the UE shall set the NAS Key Set Identifier IE to the value "no key is available". If the UE has a current EPS security context, the UE shall integrity protect the TRACKING AREA UPDATE REQUEST message with the current EPS security context. Otherwise the UE shall not integrity protect the TRACKING AREA UPDATE REQUEST message.

When the tracking area updating procedure is initiated in EMM-IDLE mode to perform an inter-system change from A/Gb mode or Iu mode to S1 mode and the TIN is set to "P-TMSI", the UE shall include the GPRS ciphering key sequence number applicable for A/Gb mode or Iu mode and a nonceUE in the TRACKING AREA UPDATE REQUEST message.

When the tracking area updating procedure is initiated in EMM-CONNECTED mode to perform an inter-system change from A/Gb mode or Iu mode to S1 mode, the UE shall derive the EPS NAS keys from the mapped K'ASME using the selected NAS algorithms, nonceMME and KSISGSN (to be associated with the mapped K'ASME) provided by lower layers as indicated in 3GPP TS 33.401 [19]. The UE shall reset both the uplink and downlink NAS COUNT counters of the mapped EPS security context which shall be taken into use. If the UE has a non-current native EPS security context, the UE shall include the KSIASME in the Non-current native NAS key set identifier IE and its associated GUTI, as specified above, either in the Old GUTI IE or in the Additional GUTI IE of the TRACKING AREA UPDATE REQUEST message. The UE shall set the TSC flag in the Non-current native NAS key set identifier IE to "native security context".

For the case z, if upper layers have indicated that IMS signalling or IMS emergency signalling was already ongoing in N1 mode before performing the inter-system change from N1 mode to S1 mode, or if the inter-system change from N1 mode to S1 mode is due to emergency services fallback, the "active" flag in the EPS update type IE shall be set to 1.

For the case z, the TRACKING AREA UPDATE REQUEST message shall be integrity protected using the 5G NAS security context available in the UE. If there is no valid 5G NAS security context available in the UE, the TRACKING AREA UPDATE REQUEST message shall be sent without integrity protection. The UE shall include a GUTI, mapped from 5G-GUTI (see 3GPP TS 23.501 [58] and 3GPP TS 23.003 [2]), in the Old GUTI IE in the TRACKING AREA UPDATE REQUEST message. In addition, the UE shall include Old GUTI type IE with GUTI set to "Native GUTI", and the UE shall include a UE status IE with a 5GMM registration status set to "UE is in 5GMM-REGISTERED state". Additionally, if the UE holds a valid GUTI, the UE shall indicate the GUTI in the Additional GUTI IE.

NOTE 6: The value of the EMM registration status included by the UE in the UE status IE is not used by the MME.

For the case zd, the TRACKING AREA UPDATE REQUEST message shall be integrity protected using the mapped EPS security context as derived when triggering the handover to E-UTRAN (see clause 4.4.2.2). The UE shall include a GUTI, mapped from 5G-GUTI (see 3GPP TS 23.501 [58] and 3GPP TS 23.003 [2]), in the Old GUTI IE in the TRACKING AREA UPDATE REQUEST message. In addition, the UE shall include Old GUTI type IE with GUTI set to "Native GUTI", and the UE shall include a UE status IE with a 5GMM registration status set to "UE is in 5GMM-REGISTERED state". Additionally, if the UE holds a valid GUTI, the UE shall indicate the GUTI in the Additional GUTI IE. If the UE has a non-current native EPS security context, the UE shall include the KSIASME in the Non-current native NAS key set identifier IE of the TRACKING AREA UPDATE REQUEST message. The UE shall set the TSC flag in the Non-current native NAS key set identifier IE to "native security context".

NOTE 7: The value of the EMM registration status included by the UE in the UE status IE is not used by the MME.

When the tracking area updating procedure is initiated in EMM-IDLE mode, the UE may also include an EPS bearer context status IE in the TRACKING AREA UPDATE REQUEST message, indicating which EPS bearer contexts are active in the UE. The UE shall include the EPS bearer context status IE in TRACKING AREA UPDATE REQUEST message:

a) for the case f;

b) for the case s;

c) for the case z;

d) if the UE has established PDN connection(s) of "non IP" or Ethernet PDN type; and

e) if the UE:

1) locally deactivated at least one dedicated EPS bearer context upon an inter-system mobility from WB-S1 mode to NB-S1 mode in EMM-IDLE mode;

2) locally deactivated at least one dedicated EPS bearer context upon an inter-system change from WB-N1 mode to NB-S1 mode in EMM-IDLE mode for the UE operating in single-registration mode (see clause 6.4.2.1); or

3) locally deactivated at least one default EPS bearer context upon an inter-system change from N1 mode to NB-S1 mode in EMM-IDLE mode for the UE operating in single-registration mode (see clause 6.5.0).

If the UE initiates the first tracking area updating procedure following an attach in A/Gb mode or Iu mode, the UE shall include a UE radio capability information update needed IE in the TRACKING AREA UPDATE REQUEST message.

If the UE initiates the first tracking area updating procedure following an initial registration in N1 mode and the UE is operating in the single-registration mode, the UE shall include a UE radio capability information update needed IE in the TRACKING AREA UPDATE REQUEST message.

For all cases except case b, if the UE supports SRVCC to GERAN/UTRAN, the UE shall set the SRVCC to GERAN/UTRAN capability bit in the MS network capability IE to "SRVCC from UTRAN HSPA or E-UTRAN to GERAN/UTRAN supported".

For all cases except case b, if the UE supports vSRVCC from S1 mode to Iu mode, then the UE shall set the H.245 after handover capability bit in the UE network capability IE to "H.245 after SRVCC handover capability supported" and additionally set the SRVCC to GERAN/UTRAN capability bit in the MS network capability IE to "SRVCC from UTRAN HSPA or E-UTRAN to GERAN/UTRAN supported" in the TRACKING AREA UPDATE REQUEST message.

For all cases except case b, if the UE supports ProSe direct discovery, then the UE shall set the ProSe bit to "ProSe supported" and set the ProSe direct discovery bit to "ProSe direct discovery supported" in the UE network capability IE of the TRACKING AREA UPDATE REQUEST message.

For all cases except case b, if the UE supports ProSe direct communication, then the UE shall set the ProSe bit to "ProSe supported" and set the ProSe direct communication bit to "ProSe direct communication supported" in the UE network capability IE of the TRACKING AREA UPDATE REQUEST message.

For all cases except case b, if the UE supports acting as a ProSe UE-to-network relay, then the UE shall set the ProSe bit to "ProSe supported" and set the ProSe UE-to-network relay bit to "acting as a ProSe UE-to-network relay supported" in the UE network capability IE of the TRACKING AREA UPDATE REQUEST message.

If the UE supports NB-S1 mode, Non-IP or Ethernet PDN type, N1 mode, UAS service or if the UE supports DNS over (D)TLS (see 3GPP TS 33.501 [24]), then the UE shall support the extended protocol configuration options IE.

NOTE 8: Support of DNS over (D)TLS is based on the informative requirements as specified in 3GPP TS 33.501 [24].

For all cases except case b, if the UE supports the extended protocol configuration options IE, then the UE shall set the ePCO bit to "extended protocol configuration options supported" in the UE network capability IE of the TRACKING AREA UPDATE REQUEST message.

If the UE supports providing PDU session ID in the protocol configuration option IE or the extended protocol configuration option IE when its N1 mode capability is disabled, then the UE shall set the ePCO bit to "extended protocol configuration options supported" in the UE network capability IE of the TRACKING AREA UPDATE REQUEST message.

For all cases except case b, if the UE supports V2X communication over E-UTRAN-PC5, then the UE shall set the V2X PC5 bit to "V2X communication over E-UTRAN-PC5 supported" in the UE network capability IE of the TRACKING AREA UPDATE REQUEST message.

For all cases except case b, if the UE supports V2X communication over NR-PC5, then the UE shall set the V2X NR-PC5 bit to "V2X communication over NR-PC5 supported" in the UE network capability IE of the TRACKING AREA UPDATE REQUEST message.

For all cases except case b, if the UE supports the restriction on use of enhanced coverage, then the UE shall set the RestrictEC bit to "Restriction on use of enhanced coverage supported" in the UE network capability IE of the TRACKING AREA UPDATE REQUEST message.

For all cases except case b, if the UE supports the control plane data back-off timer T3448, the UE shall set the CP backoff bit to "backoff timer for transport of user data via the control plane supported" in the UE network capability IE of the TRACKING AREA UPDATE REQUEST message.

For all cases except case b, if the UE supports dual connectivity with NR, then the UE shall set the DCNR bit to "dual connectivity with NR supported" in the UE network capability IE of the TRACKING AREA UPDATE REQUEST message and shall include the UE additional security capability IE in the TRACKING AREA UPDATE REQUEST message.

For all cases except case b, if the UE supports SGC, then the UE shall set the SGC bit to "service gap control supported" in the UE network capability IE of the TRACKING AREA UPDATE REQUEST message.

For all cases except case b, if the UE supports signalling for a maximum number of 15 EPS bearer contexts, then the UE shall set the 15 bearers bit to "Signalling for a maximum number of 15 EPS bearer contexts supported" in the UE network capability IE of the TRACKING AREA UPDATE REQUEST message.

For all cases except case b, if the Multi-USIM UE supports the NAS signalling connection release, then the UE shall set the NAS signalling connection release bit to "NAS signalling connection release supported" in the UE network capability IE of the TRACKING AREA UPDATE REQUEST message otherwise the UE shall not set the NAS signalling connection release bit to "NAS signalling connection release supported" in the UE network capability IE of the TRACKING AREA UPDATE REQUEST message.

For all cases except case b, if the Multi-USIM UE supports the paging indication for voice services, then the UE shall set the paging indication for voice services bit to "paging indication for voice services supported" in the UE network capability IE of the TRACKING AREA UPDATE REQUEST message otherwise the UE shall not set the paging indication for voice services bit to "paging indication for voice services supported" in the UE network capability IE of the TRACKING AREA UPDATE REQUEST message.

For all cases except case b, if the Multi-USIM UE supports the reject paging request, then the UE shall set the reject paging request bit to "reject paging request supported" in the UE network capability IE of the TRACKING AREA UPDATE REQUEST message otherwise the UE shall not set the reject paging request bit to "reject paging request supported" in the UE network capability IE of the TRACKING AREA UPDATE REQUEST message.

For all cases except case b, if the Multi-USIM UE sets:

- the reject paging request bit to "reject paging request supported";

- the NAS signalling connection release bit to "NAS signalling connection release supported"; or

- both of them;

and supports the paging restriction, then the UE shall set the paging restriction bit to "paging restriction supported" in the UE network capability IE of the TRACKING AREA UPDATE REQUEST message otherwise the UE shall not set the paging restriction bit to "paging restriction supported" in the UE network capability IE of the TRACKING AREA UPDATE REQUEST message.

For all cases except case b, if the Multi-USIM UE supports the paging timing collision control, then the UE shall set the paging timing collision control bit to "paging timing collision control supported" in the UE network capability IE of the TRACKING AREA UPDATE REQUEST message otherwise the UE shall not set the paging timing collision control bit to "paging timing collision control supported" in the UE network capability IE of the TRACKING AREA UPDATE REQUEST message.

For all cases except cases b and zb, if the UE supports ciphered broadcast assistance data and the UE needs to obtain new ciphering keys, the UE shall include the Additional information requested IE with the CipherKey bit set to "ciphering keys for ciphered broadcast assistance data requested" in the TRACKING AREA UPDATE REQUEST message.

For case ee, the UE shall include the Additional information requested IE with the CipherKey bit set to "ciphering keys for ciphered broadcast assistance data requested" in the TRACKING AREA UPDATE REQUEST message.

For case a, if the UE supports ciphered broadcast assistance data and the UE detects entering a tracking area for which one or more ciphering keys stored at the UE is not applicable, the UE should include the Additional information requested IE with the CipherKey bit set to "ciphering keys for ciphered broadcast assistance data requested" in the TRACKING AREA UPDATE REQUEST message.

For case b, if the UE supports ciphered broadcast assistance data and the remaining validity time for one or more ciphering keys stored at the UE is less than timer T3412, the UE should include the Additional information requested IE with the CipherKey bit set to "ciphering keys for ciphered broadcast assistance data requested" in the TRACKING AREA UPDATE REQUEST message.

For all cases except case b, if the UE supports N1 mode for 3GPP access, the UE shall set the N1mode bit to "N1 mode for 3GPP access supported" in the UE network capability IE of the TRACKING AREA UPDATE REQUEST message and shall include the UE additional security capability IE in the TRACKING AREA UPDATE REQUEST message.

For all cases except case b, in WB-S1 mode, if the UE supports RACS the UE shall set the RACS bit to "RACS supported" in the UE network capability IE of the TRACKING AREA UPDATE REQUEST message.

For cases n, za and zc, in WB-S1 mode, if the UE supports RACS and the UE has an applicable UE radio capability ID for the new UE radio configuration in the selected PLMN, the UE shall set the URCIDA bit to "UE radio capability ID available" in the UE radio capability ID availability IE of the TRACKING AREA UPDATE REQUEST message.

For all cases except cases b, n, za and zc, in WB-S1 mode, if the UE has an applicable UE radio capability ID for the current UE radio configuration in the selected PLMN, the UE shall set the URCIDA bit to "UE radio capability ID available" in the UE radio capability ID availability IE of the TRACKING AREA UPDATE REQUEST message.

For all cases except case b, if the UE supports WUS assistance, then the UE shall set the WUSA bit to "WUS assistance supported" in the UE network capability IE, and if the UE is not attaching for emergency bearer services, the UE may include its UE paging probability information in the Requested WUS assistance information IE in the TRACKING AREA UPDATE REQUEST message.

For all cases except case a, except case b, for a MUSIM capable UE if the UE needs to indicate an IMSI offset value to the network and the network has indicated to the UE that it supports paging timing collision control, the UE shall include the IMSI offset value in the Requested IMSI offset IE in the TRACKING AREA UPDATE REQUEST message.

For case a, MUSIM capable UE may include the IMSI offset value in the Requested IMSI offset IE in the TRACKING AREA UPDATE REQUEST message even if the network has not indicated that it supports paging timing collision control.

If the network supports the NAS signalling connection release, the UE supports MUSIM and requests the network to release the NAS signalling connection, the UE shall set Request type to "NAS signalling connection release" in the UE request type IE and, if the network supports the paging restriction, may set the paging restriction preference in the Paging restriction IE in the TRACKING AREA UPDATE REQUEST message. In addition, the UE shall

- set the "active" flag to 0 in the EPS update type IE; and

- set the "signalling active" flag to 0 in the Additional update type IE, if the Additional update type IE is included.

NOTE 9: If the network has already indicated support for NAS signalling connection release in the current stored tracking area list, the MUSIM UE is allowed to request the network to release the NAS signalling connection during tracking area updating procedure that is due to mobility to a tracking area outside the current tracking area list even before detecting whether the network supports the NAS signalling connection release in the new tracking area.

NOTE 10: If the network has already indicated support for paging restriction in the current stored tracking area list, the MUSIM UE is allowed to include paging restriction together with the request to the network to release the NAS signalling connection during tracking area updating procedure that is due to mobility to a tracking area outside the current tracking area list even before detecting whether the network supports the paging restriction in the new tracking area.



Figure 5.5.3.2.2.1: Tracking area updating procedure

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

##### 5.5.3.3.2 Combined tracking area updating procedure initiation

The UE operating in CS/PS mode 1 or CS/PS mode 2, in state EMM-REGISTERED, shall initiate the combined tracking area updating procedure:

a) when the UE that is attached for both EPS and non-EPS services detects entering a tracking area that is not in the list of tracking areas that the UE previously registered in the MME, unless the UE is configured for "AttachWithIMSI" as specified in 3GPP TS 24.368 [15A] or 3GPP TS 31.102 [17] and is entering a tracking area in a new PLMN that is neither the registered PLMN nor in the list of equivalent PLMNs;

b) when the UE that is attached for EPS services wants to perform an attach for non-EPS services. In this case the EPS update type IE shall be set to "combined TA/LA updating with IMSI attach";

c) when the UE performs an intersystem change from A/Gb mode to S1 mode and the EPS services were previously suspended in A/Gb mode;

d) when the UE performs an intersystem change from A/Gb or Iu mode to S1 mode, and the UE previously either performed a combined GPRS attach procedure, an IMSI attach procedure, a location area updating procedure or a combined routing area updating procedure, in A/Gb or Iu mode, or moved to A/Gb or Iu mode from S1 mode through an SRVCC handover or moved to Iu mode from S1 mode through an vSRVCC handover. In this case the EPS update type IE shall be set to "combined TA/LA updating with IMSI attach";

e) when the UE enters EMM-REGISTERED.NORMAL-SERVICE and the UE's TIN indicates "P-TMSI";

f) when the UE receives an indication from the lower layers that the RRC connection was released with cause "load balancing TAU required";

g) when the UE deactivated EPS bearer context(s) locally while in EMM-REGISTERED, because it was not able or not allowed to establish a NAS signalling connection, and then returns to EMM-REGISTERED.NORMAL-SERVICE and no EXTENDED SERVICE REQUEST message, CONTROL PLANE SERVICE REQUEST message or DETACH REQUEST message is pending to be sent by the UE;

h) when the UE changes any one of the UE network capability information, the MS network capability information or the N1 UE network capability information;

i) when the UE changes the UE specific DRX parameter;

j) when the UE receives an indication of "RRC Connection failure" from the lower layers and has no signalling or user uplink data pending (i.e. when the lower layer requests NAS signalling connection recovery);

k) when due to manual CSG selection the UE has selected a CSG cell whose CSG identity and associated PLMN identity are not included in the UE's Allowed CSG list or in the UE's Operator CSG list;

l) when the UE reselects an E-UTRAN cell while it was in GPRS READY state or PMM-CONNECTED mode;

m) when the UE supports SRVCC to GERAN or UTRAN or supports vSRVCC to UTRAN, and changes the mobile station classmark 2 or the supported codecs, or the UE supports SRVCC to GERAN and changes the mobile station classmark 3;

n) when the UE changes the radio capability for GERAN or cdma2000® or both;

o) when the UE's usage setting or the voice domain preference for E-UTRAN change in the UE;

p) when the UE activates mobility management for IMS voice termination as specified in 3GPP TS 24.008 [13], annex P.2, and the TIN indicates "RAT-related TMSI";

q) when the UE performs an intersystem change from A/Gb mode to S1 mode and the TIN indicates "RAT-related TMSI", but the UE is required to perform tracking area updating for IMS voice termination as specified in 3GPP TS 24.008 [13], annex P.4;

r) upon reception of a paging indication, if the UE is in state EMM-REGISTERED.ATTEMPTING-TO-UPDATE and the paging indication uses S-TMSI or it uses IMSI with domain indicator set to ″CS″;

NOTE 1: As an implementation option, the Multi-USIM UE is allowed to not respond to paging based on the paging cause indication.

s) when the UE needs to update the network with EPS bearer context status due to local de-activation of EPS bearer context(s) as specified in clause 6.5.1.4A;

t) when the UE performs an intersystem change from A/Gb or Iu mode to S1 mode, and the UE has previously performed the MM connection establishment for CS fallback emergency calls (see 3GPP TS 24.008 [13], clause 4.5.1.5a) without performing a location area updating procedure or combined routing area updating procedure while camping on a location area which is different from the stored location area. In this case, the EPS update type IE shall be set to "combined TA/LA updating with IMSI attach";

u) when the UE performs an intersystem change from A/Gb or Iu mode to S1 mode, and the MM update status is U2 NOT UPDATED. In this case the EPS update type IE shall be set to "combined TA/LA updating with IMSI attach";

v) when the UE needs to request the use of PSM or needs to stop the use of PSM;

w) when the UE needs to request the use of eDRX or needs to stop the use of eDRX;

x) when a change in the eDRX usage conditions at the UE requires different extended DRX parameters;

y) when a change in the PSM usage conditions at the UE requires a different timer T3412 value or different timer T3324 value;

NOTE 2: A change in the PSM or eDRX usage conditions at the UE can include e.g. a change in the UE configuration, a change in requirements from upper layers or the battery running low at the UE.

z) when the CIoT EPS optimizations the UE needs to use, change in the UE;

za) when the Default\_DCN\_ID value changes, as specified in 3GPP TS 24.368 [15A] or in USIM file NASCONFIG as specified in 3GPP TS 31.102 [17];

NOTE 3: The tracking area updating procedure is initiated after deleting the DCN-ID list as specified in annex C.

zb) when the UE performs inter-system change from N1 mode to S1 mode in EMM-IDLE mode, the UE operates in single-registration mode, and conditions specified in 3GPP TS 24.501 [54] apply;

zc) when the UE in EMM-IDLE mode changes the radio capability for E-UTRAN;

zd) when the UE performs inter-system change from N1 mode to S1 mode in EMM-CONNECTED mode;

ze) when the UE in EMM-IDLE mode changes the radio capability for NG-RAN;

zf) in WB-S1 mode, when the applicable UE radio capability ID for the current UE radio configuration changes due to a reselection to a new PLMN or a revocation of the network-assigned UE radio capability IDs by the serving PLMN; or

zg) when the UE needs to use the WUS assistance, stop to use the WUS assistance, or change the conditions for using the WUS assistance.

For case c, if the TIN indicates "RAT-related TMSI" and the EPS services were not resumed before returning to S1 mode, the UE shall set the TIN to "P-TMSI" before initiating the combined tracking area updating procedure.

For cases n, zc, ze and zf, the UE shall include a UE radio capability information update needed IE in the TRACKING AREA UPDATE REQUEST message.

If the UE is in the EMM-CONNECTED mode and the UE changes the radio capability for E-UTRAN or for NG-RAN, the UE may locally release the established NAS signalling connection and enter the EMM-IDLE mode. Then, the UE shall initiate the combined tracking area updating procedure including a UE radio capability information update needed IE in the TRACKING AREA UPDATE REQUEST message.

For case l, if the TIN indicates "RAT-related TMSI", the UE shall set the TIN to "P-TMSI" before initiating the combined tracking area updating procedure.

For case r, the "active" flag in the EPS update type IE shall be set to 1. If the paging is received for CS fallback, the UE shall send the EXTENDED SERVICE REQUEST message to the MME by using the existing NAS signalling connection after the completion of the tracking area updating procedure. If the TRACKING AREA UPDATE ACCEPT message includes a UE radio capability ID deletion indication IE set to "Network-assigned UE radio capability IDs deletion requested", the UE shall proceed with sending the EXTENDED SERVICE REQUEST message.To initiate a combined tracking area updating procedure the UE sends the message TRACKING AREA UPDATE REQUEST to the network, starts timer T3430 and changes to state EMM-TRACKING-AREA-UPDATING-INITIATED. The value of the EPS update type IE in the message shall indicate "combined TA/LA updating" unless explicitly specified otherwise.

If the UE initiates the combined tracking area updating procedure for EPS services and "SMS only", the UE shall indicate "SMS only" in the additional update type IE.

The UE shall include the TMSI status IE if no valid TMSI is available. Furthermore, if the UE has stored a valid location area identification, the UE shall include it in the Old location area identification IE in the TRACKING AREA UPDATE REQUEST message.

If the UE has stored a valid TMSI, the UE shall include the TMSI based NRI container IE in the TRACKING AREA UPDATE REQUEST message.

The UE shall include the EPS bearer context status IE in TRACKING AREA UPDATE REQUEST message:

a) for the case g;

b) for the case s;

c) for the case zb;

d) if the UE has established PDN connection(s) of "non IP" or Ethernet PDN type; and

e) if the UE:

1) locally deactivated at least one dedicated EPS bearer context upon an inter-system mobility from WB-S1 mode to NB-S1 mode in EMM-IDLE mode;

2) locally deactivated at least one dedicated EPS bearer context upon an inter-system change from WB-N1 mode to NB-S1 mode in EMM-IDLE mode for the UE operating in single-registration mode (see clause 6.4.2.1); or

3) locally deactivated at least one default EPS bearer context upon an inter-system change from N1 mode to NB-S1 mode in EMM-IDLE mode for the UE operating in single-registration mode (see clause 6.5.0).

In WB-S1 mode, if the UE supports RACS the UE shall set the RACS bit to "RACS supported" in the UE network capability IE of the TRACKING AREA UPDATE REQUEST message.

For cases n, zc and ze, in WB-S1 mode, if the UE supports RACS and the UE has an applicable UE radio capability ID for the new UE radio configuration in the selected PLMN, the UE shall set the URCIDA bit to "UE radio capability ID available" in the UE radio capability ID availability IE of the TRACKING AREA UPDATE REQUEST message.

For all cases except cases n, zc and ze, in WB-S1 mode, if the UE has an applicable UE radio capability ID for the current UE radio configuration in the selected PLMN, the UE shall set the URCIDA bit to "UE radio capability ID available" in the UE radio capability ID availability IE of the TRACKING AREA UPDATE REQUEST message.

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

#### 5.6.1.1 General

The purpose of the service request procedure is to transfer the EMM mode from EMM-IDLE to EMM-CONNECTED mode. If the UE is not using EPS services with control plane CIoT EPS optimization, this procedure is used to establish the radio and S1 bearers when user data or signalling is to be sent. If the UE is using EPS services with control plane CIoT EPS optimization, this procedure can be used for UE initiated transfer of user data via the control plane. Another purpose of this procedure is to invoke MO/MT CS fallback or 1xCS fallback procedures.

This procedure is used when:

- the network has downlink signalling pending;

- the UE has uplink signalling pending;

- the UE or the network has user data pending and the UE is in EMM-IDLE mode;

- the UE is in EMM-CONNECTED mode and has a NAS signalling connection only; the UE is using EPS services with control plane CIoT EPS optimization, and it has user data pending which is to be transferred via user plane radio bearers;

- the UE in EMM-IDLE or EMM-CONNECTED mode has requested to perform mobile originating/terminating CS fallback or 1xCS fallback;

- the network has downlink cdma2000® signalling pending;

- the UE has uplink cdma2000® signalling pending;

- the UE has to request resources for ProSe direct discovery or Prose direct communication;

- the UE has to request resources for V2X communication over PC5;

- the UE that is MUSIM capable and in EMM-IDLE mode requests the network to remove the paging restriction; or

- to indicate to the network that the UE supporting MUSIM requests the release of the NAS signalling connection or reject paging.

The service request procedure is initiated by the UE, however, for the downlink transfer of signalling, cdma2000® signalling or user data in EMM-IDLE mode, the trigger is given by the network by means of the paging procedure (see clause 5.6.2).

The UE shall invoke the service request procedure when:

a) the UE in EMM-IDLE mode receives a paging request using S-TMSI with CN domain indicator set to "PS" from the network;

b) the UE, in EMM-IDLE mode, has pending user data to be sent;

c) the UE, in EMM-IDLE mode, has uplink signalling pending;

d) the UE in EMM-IDLE or EMM-CONNECTED mode is configured to use CS fallback and has a mobile originating CS fallback request from the upper layer;

e) the UE in EMM-IDLE mode is configured to use CS fallback and receives a paging request with CN domain indicator set to "CS", or the UE in EMM-CONNECTED mode is configured to use CS fallback and receives a CS SERVICE NOTIFICATION message;

f) the UE in EMM-IDLE or EMM-CONNECTED mode is configured to use 1xCS fallback and has a mobile originating 1xCS fallback request from the upper layer;

g) the UE in EMM-CONNECTED mode is configured to use 1xCS fallback and accepts cdma2000® signalling messages containing a 1xCS paging request received over E-UTRAN;

h) the UE, in EMM-IDLE mode, has uplink cdma2000® signalling pending to be transmitted over E-UTRAN;

i) the UE, in EMM-IDLE or EMM-CONNECTED mode, is configured to use 1xCS fallback, accepts cdma2000® signalling messages containing a 1xCS paging request received over cdma2000® 1xRTT, and the network supports dual Rx CSFB or provide CS fallback registration parameters (see 3GPP TS 36.331 [22]);

NOTE 1: As an implementation option, the Multi-USIM UE is allowed to not respond to paging based on the paging cause indication.

j) the UE, in EMM-IDLE or EMM-CONNECTED mode, has uplink cdma2000® signalling pending to be transmitted over cdma2000® 1xRTT, and the network supports dual Rx CSFB or provide CS fallback registration parameters (see 3GPP TS 36.331 [22]);

k) the UE performs an inter-system change from S101 mode to S1 mode and has user data pending;

l) the UE in EMM-IDLE mode has to request resources for ProSe direct discovery or Prose direct communication (see 3GPP TS 36.331 [22]);

m) the UE, in EMM-CONNECTED mode and has a NAS signalling connection only, is using EPS services with control plane CIoT EPS optimization and has pending user data to be sent via user plane radio bearers;

n) the UE in EMM-IDLE mode has to request resources for V2X communication over PC5 (see 3GPP TS 23.285 [47]);

o) the network supports the paging restriction and the UE that is MUSIM capable and in EMM-IDLE mode is requesting the network to remove the paging restriction;

p) the network supports the NAS signalling connection release and the UE supports MUSIM, in EMM-CONNECTED mode requests the network to release the NAS signalling connection and, if the network supports the paging restriction, optionally includes paging restrictions; or

q) the network supports the reject paging request and the UE supports MUSIM, in EMM-IDLE mode when responding to paging rejects the paging request from the network, requests the network to release the NAS signalling connection and, if the network supports the paging restriction, optionally includes paging restrictions.

If one of the above criteria to invoke the service request procedure is fulfilled, then the service request procedure may only be initiated by the UE when the following conditions are fulfilled:

- its EPS update status is EU1 UPDATED, and the TAI of the current serving cell is included in the TAI list; and

- no EMM specific procedure is ongoing.

The UE that is MUSIM capable shall not initiate service request procedure for requesting the network to release the NAS signalling connection if the UE is attached for emergency bearer services or if the UE has a PDN connection for emergency bearer services established.



NOTE 1: AS indications (indications from lower layers) are results of procedures triggered by MME in service request procedure. Triggered procedures could be e.g. RRC connection reconfiguration procedure (see 3GPP TS 36.331 [22]) and inter system PS handover to GERAN or UTRAN procedure as a result of CSFB procedure (see 3GPP TS 23.272 [9]).

NOTE 2: For 1xCS fallback, the UE sends the EXTENDED SERVICE REQUEST message and starts timer T3417. The procedure is considered completed upon receiving indication of system change from AS.

Figure 5.6.1.1.1: Service request procedure (part 1)



NOTE 1: Security protected NAS message: this could be e.g. a SECURITY MODE COMMAND, SERVICE ACCEPT, or ESM DATA TRANSPORT message.

NOTE 2: AS indications (indications from lower layers) are results of procedures triggered by MME in service request procedure. Triggered procedures could be e.g. an RRC connection release procedure or RRC connection reconfiguration procedure (see 3GPP TS 36.331 [22]).

Figure 5.6.1.1.2: Service request procedure (part 2)

A service request attempt counter is used to limit the number of service request attempts and no response from the network. The service request attempt counter shall be incremented as specified in clause 5.6.1.6.

The service request attempt counter shall be reset when:

- a normal or periodic tracking area updating or a combined tracking area updating procedure is successfully completed;

- a service request procedure in order to obtain packet services is successfully completed;

- a service request procedure is rejected as specified in clause 5.6.1.5 or clause 5.3.7b; or

- the UE moves to EMM-DEREGISTERED state.

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

##### 5.6.2.2.1.1 General

The network shall initiate the paging procedure for EPS services using S-TMSI with CN domain indicator set to "PS" when:

- NAS signalling messages, cdma2000® signalling messages or user data is pending to be sent to the UE;

- no NAS signalling connection exists (see example in figure 5.6.2.2.1.1); and

- there is no paging restriction applied in the network for that paging.

For the UE using eDRX, the network initiates the paging procedure when NAS signalling messages, cdma2000® signalling messages or user data is pending to be sent to the UE within the paging time window. If NAS signalling messages, cdma2000® signalling messages or user data is pending to be sent to the UE outside the paging time window and the eDRX value that the network provides to the UE in the Extended DRX parameters IE during the last attach procedure or the last tracking area updating procedure is not all zeros (i.e. the E-UTRAN eDRX cycle length duration is higher than 5.12 seconds), the network initiates the paging procedure at T time ahead of the beginning of the next paging time window.

NOTE 1: T time is a short time period based on implementation. The operator can take possible imperfections in the synchronization between the CN and the UE into account when choosing T time.



Figure 5.6.2.2.1.1: Paging procedure using S-TMSI

To initiate the procedure the EMM entity in the network requests the lower layer to start paging (see 3GPP TS 36.300 [20], 3GPP TS 36.413 [23]) and shall start the timer:

- T3415 for this paging procedure, if the network accepted to use eDRX for the UE and the UE does not have a PDN connection for emergency bearer services.

- Otherwise, T3413 for this paging procedure.

If the network detects that the pending user data to be sent to the UE is related to the voice service as specified in 3GPP TS 23.401 [7] and the network decides to initiate the paging procedure based on the stored paging restriction information, if any, the EMM entity in the network should request the lower layer to include the Voice Service Indication in the Paging message when the UE and the network support the paging cause feature.

If the network starts timer T3415, the network shall set timer T3415 to a value smaller than the value of timer T3-RESPONSE (see 3GPP TS 29.274 [16D] for further details on timer T3-RESPONSE).

The EMM entity may provide the lower layer with a list of CSG IDs, including the CSG IDs of both the expired and the not expired subscriptions. If there is a PDN connection for emergency bearer services established, the EMM entity in the network shall not provide the list of CSG IDs to the lower layer.

If the negotiated UE paging probability information is available in the EMM context of the UE, the EMM entity shall provide the lower layer with the negotiated UE paging probability information (see 3GPP TS 36.300 [20], 3GPP TS 36.413 [23]).

Upon reception of a paging indication, if control plane CIoT EPS optimization is not used by the UE, the UE shall stop the timer T3346, if running, and shall initiate:

- a service request procedure to respond to the paging (see 3GPP TS 23.401 [10] and 3GPP TS 36.413 [23]); or

- a tracking area updating procedure as specified in clauses 5.5.3.2.2 and 5.5.3.3.2.

and additionally if the UE is in the EMM-IDLE mode with suspend indication, resume the suspended NAS signalling connection to the MME as specified in clause 5.3.1.3.

Upon reception of a paging indication, if control plane CIoT EPS optimization is used by the UE, the UE shall stop the timer T3346, if running, and shall additionally:

- initiate a service request procedure as specified in clause 5.6.1.2.2 if the UE is in the EMM-IDLE mode without suspend indication;

- initiate a tracking area updating procedure as specified in clauses 5.5.3.2.2; or

- proceed the behaviour as specified in clause 5.3.1.3 if the UE is in the EMM-IDLE mode with suspend indication.

NOTE 2: If the UE is in the EMM-IDLE mode without suspend indication and has an uplink user data to be sent to the network using control plane CIoT EPS optimization when receiving the paging indication, the UE can piggyback the uplink user data during the service request procedure initiated to respond to the paging, as specified in clause 5.6.1.2.2.

Upon reception of a paging indication, if the network supports the reject paging request and the MUSIM capable UE decides not to accept the paging, the UE may initiate a service request procedure to reject the paging as specified in clause 5.6.1.1.

NOTE 3: As an implementation option, MUSIM-capable UE is allowed to not respond to paging based on the paging cause indication.

If the paging for EPS services was received during an ongoing UE-initiated EMM specific procedure or service request procedure, then the UE shall ignore the paging. The network shall proceed with the EMM specific procedure or the service request procedure, and stop the timer for the paging procedure (i.e. either timer T3413 or timer T3415). If the network receives an ATTACH REQUEST message when the paging procedure is ongoing, it should be considered as an abnormal case, and the behaviour of the network for this case is specified in clause 5.6.2.2.1.2.

The network shall stop the timer for the paging procedure (i.e. either timer T3413 or timer T3415) when an integrity-protected response is received from the UE and successfully integrity checked by the network or when the EMM entity in the MME receives an indication from the lower layer that it has received the S1-AP UE context resume request message as specified in 3GPP TS 36.413 [23]. If the response received is not integrity protected, or the integrity check is unsuccessful, the timer for the paging procedure (i.e. either timer T3413 or timer T3415) shall be kept running unless:

- the UE has a PDN connection for emergency bearer services; or

- the response received is a TRACKING AREA UPDATE REQUEST message and the security mode control procedure or authentication procedure performed during tracking area updating procedure has completed successfully.

Upon expiry of timer T3413, the network may reinitiate paging.

If the network, while waiting for a response to the paging sent without paging priority, receives downlink signalling or downlink data associated with priority EPS bearers, the network shall stop the timer for the paging procedure (i.e. either timer T3413 or timer T3415), and then initiate the paging procedure with paging priority.

Upon expiry of timer T3415, the network shall abort the paging procedure and shall proceed as specified in 3GPP TS 23.401 [10].

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