**3GPP TSG-CT WG1 Meeting #130-eC1-21xxxx**

**Electronic meeting, 20-28 May 2021**

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
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|  | **24.301** | **CR** | **3534** | **rev** | **1** | **Current version:** | **17.2.0** |  |
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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 |  | ME | **x** | Radio Access Network |  | Core Network | **x** |

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|  |
| ***Title:***  | Leaving procedure and Reject Paging Indication for Multi-USIM UEs in EPS |
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| ***Source to WG:*** | Apple, InterDigital |
| ***Source to TSG:*** | C1 |
|  |  |
| ***Work item code:*** | MUSIM |  | ***Date:*** | 2021-05-02 |
|  |  |  |  |  |
| ***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 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-15 (Release 15)Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)* |
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| ***Reason for change:*** | S2-2101102 (CR 3625 for 23.401) was approved. The stage-2 CR introduces a feature for MUSIM devices wherein UE can request network to release NAS connection and also provide paging filtering information in EPS.S2-2103029 (CR 3627 for 23.401) was approved. The stage-2 CR introduces Reject paging indication response for MUSIM devices.Corresponding stage-3 changes are required for EPS. |
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| ***Summary of change:*** | - Abbreviation MUSIM added- New IE UE request type to allow UE to request to release NAS signalling connection or reject paging for one USIM due to activity on another USIM.- New IE Paging restriction to define restrictions on paging due to downlink data. The IE includes a bitmap for PDN connections associated with EPS bearer identities for which paging is restricted. The paging restrictions are included only when UE request type is specified.- Updates to TAU Request message due to inclusion of above IEs- Updates to Extended Service Request and Control Plane Service Request message due to inclusion of above IEs- Updates to Service Request procedure: Trigger condition added to release NAS connection in connected mode due to activity in another USIM and include paging preferences. Another trigger condition added for rejecting paging.UE requests to release NAS connection and in addition specifies paging restriction preferences in EXTENDED SERVICE REQUEST message. Updates on network side for MME to handle leaving request and store or delete paging restrictions and apply these restrictions accordingly in paging procedure. MME sends SERVICE ACCEPT when paging restrictions are included by UE, so that the UE gets an acknowledgement of paging preferences having been received and processed by MME and that acts as indication of completion of Service Request procedure for the UE. When no paging preferences are included by UE, MME just releases the NAS connection and indication from lower layers that RRC connection has been released acts as indication of completion of Service Request procedure for the UE.- Updates to TAU procedure:No new trigger conditions have been added to TAU procedure for leaving or for updating paging restrictions as per agreements in stage-2. UE requests to release NAS connection and in addition specifies paging restriction preferences when performing TAU for other reasons. MME updates paging restriction preferences in the network. |
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| ***Consequences if not approved:*** | Co-ordinated leaving functionality and Reject Paging functionality is not supported for a UE supporting MUSIM. |
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| ***Clauses affected:*** | 3.2, 5.5.3.1, 5.5.3.2.2, 5.5.3.2.4, 5.6.1.1, 5.6.1.2.1, 5.6.1.2.2, 5.6.1.4.1, 5.6.1.4.2, 8.2.15.1, 8.2.15.X (new), 8.2.15.Y (new), 8.2.29.1, 8.2.29.X (new), 8.2.29.Y (new), 8.2.33.1, 8.2.33.X (new), 8.2.33.Y (new), 9.9.3.XX (new), 9.9.3.YY (new) |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** | **X** |  |  Other core specifications  | TS 23.401 CR 3622  |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** | SA2 CR #3622 for 23.401 (S2-2103057) has stage-2 updates for Paging restrictions and this CR has dependency on that |
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| ***This CR's revision history:*** |  |

\*\*\*\*\* First change \*\*\*\*\*

## 3.2 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [1].

5G-GUTI 5G-Globally Unique Temporary Identifier

5GMM 5GS Mobility Management

5GS 5G System

ACDC Application specific Congestion control for Data Communication

AKA Authentication and Key Agreement

AMBR Aggregate Maximum Bit Rate

APN Access Point Name

APN-AMBR APN Aggregate Maximum Bit Rate

ARP Allocation Retention Priority

BCM Bearer Control Mode

CIoT Cellular IoT

CP-CIoT Control Plane CIoT

CP-EDT Control Plane EDT

CSG Closed Subscriber Group

E-UTRA Evolved Universal Terrestrial Radio Access

E-UTRAN Evolved Universal Terrestrial Radio Access Network

EAB Extended Access Barring

ECM EPS Connection Management

eDRX Extended idle-mode DRX cycle

EDT Early Data Transmission

EENLV Extended Emergency Number List Validity

eKSI Key Set Identifier for E-UTRAN

EMM EPS Mobility Management

eNode B Evolved Node B

EPC Evolved Packet Core Network

EPS Evolved Packet System

ESM EPS Session Management

GBR Guaranteed Bit Rate

GUMMEI Globally Unique MME Identifier

GUTI Globally Unique Temporary Identifier

HeNB Home eNode B

HRPD High Rate Packet Data

IoT Internet of Things

IP-CAN IP-Connectivity Access Network

ISR Idle mode Signalling Reduction

kbps Kilobits per second

KSI Key Set Identifier

L-GW Local PDN Gateway

LHN-ID Local Home Network Identifier

LIPA Local IP Access

M-TMSI M-Temporary Mobile Subscriber Identity

Mbps Megabits per second

MBR Maximum Bit Rate

MME Mobility Management Entity

MMEC MME Code

MT-EDT Mobile Terminated-Early Data Transmission

MUSIM Multi-USIM

NB-IoT Narrowband IoT

NR New Radio

NSSAI Network Slice Selection Assistance Information

PD Protocol Discriminator

PDN GW Packet Data Network Gateway

ProSe Proximity-based Services

PSM Power Saving Mode

PTI Procedure Transaction Identity

QCI QoS Class Identifier

QoS Quality of Service

RACS Radio Capability Signalling Optimisation

RLOS Restricted Local Operator Services

ROHC RObust Header Compression

RRC Radio Resource Control

S-NSSAI Single NSSAI

S-TMSI S-Temporary Mobile Subscriber Identity

S101-AP S101 Application Protocol

S1AP S1 Application Protocol

SAE System Architecture Evolution

SCEF Service Capability Exposure Function

SGC Service Gap Control

SIPTO Selected IP Traffic Offload

TA Tracking Area

TAC Tracking Area Code

TAI Tracking Area Identity

TFT Traffic Flow Template

TI Transaction Identifier

TIN Temporary Identity used in Next update

URN Uniform Resource Name

V2X Vehicle-to-Everything

WUS Wake-Up Signal

\*\*\*\*\* 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;

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 subclause 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 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.

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 3: 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; or

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.

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 subclause 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 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 4: 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 5: 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 subclause 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 6: 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 subclause 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 subclause 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, 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 7: 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.

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 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, the UE shall set the N1mode bit to "N1 mode 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.

If 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 requested" in the UE request type IE and may set the paging restriction preferences 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.

Editor’s Note [MUSIM]: What is meant by "If the UE supports MUSIM" and all such statements in the specification is for FFS and will be specified subsequently



Figure 5.5.3.2.2.1: Tracking area updating procedure

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

##### 5.5.3.2.4 Normal and periodic tracking area updating procedure accepted by the network

If the tracking area update request has been accepted by the network, the MME shall send a TRACKING AREA UPDATE ACCEPT message to the UE. If the MME assigns a new GUTI for the UE, a GUTI shall be included in the TRACKING AREA UPDATE ACCEPT message. In this case, the MME shall start timer T3450 and enter state EMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.4.1. The MME may include a new TAI list for the UE in the TRACKING AREA UPDATE ACCEPT message. The MME shall not assign a TAI list containing both tracking areas in NB-S1 mode and tracking areas in WB-S1 mode.

NOTE 1: When assigning the TAI list, the MME can take into account the eNodeB's capability of support of CIoT EPS optimization.

If the UE has included the UE network capability IE or the MS network capability IE or both in the TRACKING AREA UPDATE REQUEST message, the MME shall store all octets received from the UE, up to the maximum length defined for the respective information element.

NOTE 2: This information is forwarded to the new MME during inter-MME handover or to the new SGSN during inter-system handover to A/Gb mode or Iu mode.

NOTE 3: For further details concerning the handling of the MS network capability and UE network capability in the MME see also 3GPP TS 23.401 [10].

In NB-S1 mode, if the tracking area update request is accepted by the network, the MME shall set the EMC BS bit to zero in the EPS network feature support IE included in the TRACKING AREA UPDATE ACCEPT message to indicate that support of emergency bearer services in NB-S1 mode is not available.

If a UE radio capability information update needed IE is included in the TRACKING AREA UPDATE REQUEST message, the MME shall delete the stored UE radio capability information or the UE radio capability ID, if any.

If the UE specific DRX parameter was included in the DRX Parameter IE in the TRACKING AREA UPDATE REQUEST message, the network shall replace any stored UE specific DRX parameter with the received parameter and use it for the downlink transfer of signalling and user data in WB-S1 mode.

In NB-S1 mode, if the DRX parameter in NB-S1 mode IE was included in the TRACKING AREA UPDATE REQUEST message, the MME shall provide to the UE the Negotiated DRX parameter in NB-S1 mode IE in the TRACKING AREA UPDATE ACCEPT message. The MME shall replace any stored UE specific DRX parameter in NB-S1 mode with the negotiated DRX parameter and use it for the downlink transfer of signalling and user data in NB-S1 mode.

NOTE 4: In NB-S1 mode, if a DRX parameter was included in the Negotiated DRX parameter in NB-S1 mode IE in the TRACKING AREA UPDATE ACCEPT message, then the UE stores and uses the received DRX parameter in NB-S1 mode (see 3GPP TS 36.304 [21]). If the UE has included the DRX parameter in NB-S1 mode IE in the TRACKING AREA UPDATE REQUEST message, but did not receive a DRX parameter in the Negotiated DRX parameter in NB-S1 mode IE, or if the Negotiated DRX parameter in NB-S1 mode IE was not included in the TRACKING AREA UPDATE ACCEPT message, then the UE uses the cell specific DRX value in NB-S1 mode (see 3GPP TS 36.304 [21]).If the UE requests "control plane CIoT EPS optimization" in the Additional update type IE, indicates support of control plane CIoT EPS optimization in the UE network capability IE and the MME decides to accept the requested CIoT EPS optimization and the tracking area update request, the MME shall indicate "control plane CIoT EPS optimization supported" in the EPS network feature support IE.

In NB-S1 mode, if the UE requested "SMS only" in the Additional update type IE, supports NB-S1 mode only and the MME decides to accept the tracking area update request for EPS services and "SMS only", the MME shall indicate "SMS only" in the Additional update result IE and shall set the EPS update type IE to "TA updating" in the TRACKING AREA UPDATE ACCEPT message.

The MME shall include the extended DRX parameters IE in the TRACKING AREA UPDATE ACCEPT message only if the extended DRX parameters IE was included in the TRACKING AREA UPDATE REQUEST message, and the MME supports and accepts the use of eDRX.

If:

- the UE supports WUS assistance; and

- the MME supports and accepts the use of WUS assistance,

then the MME shall determine the negotiated UE paging probability information for the UE, store it in the EMM context of the UE, and if the UE is not attaching for emergency bearer services, the MME shall include it in the Negotiated WUS assistance information IE in the TRACKING AREA UPDATE ACCEPT message. The MME may take into account the UE paging probability information received in the Requested WUS assistance information IE when determining the negotiated UE paging probability information for the UE.

NOTE 4: Besides the UE paging probability information requested by the UE, the MME can take local configuration or previous statistical information for the UE into account when determining the negotiated UE paging probability information for the UE (see 3GPP TS 23.401 [10]).

If the UE indicates support for EMM-REGISTERED without PDN connection in the TRACKING AREA UPDATE REQUEST message and the MME supports EMM-REGISTERED without PDN connection, the MME shall indicate this in the EPS network feature support IE of the TRACKING AREA UPDATE ACCEPT message. The UE and the MME shall use the information whether the peer entity supports EMM-REGISTERED without PDN connection as specified in the present clause 5 and in clause 6.

If an EPS bearer context status IE is included in the TRACKING AREA UPDATE REQUEST message, the MME shall deactivate all those EPS bearer contexts locally (without peer-to-peer signalling between the MME and the UE) which are in ESM state BEARER CONTEXT ACTIVE or BEARER CONTEXT MODIFY PENDING on the network side, but are indicated by the UE as being in ESM state BEARER CONTEXT INACTIVE. If a default EPS bearer context is marked as inactive in the EPS bearer context status IE included in the TRACKING AREA UPDATE REQUEST message, and this default bearer is not associated with the last remaining PDN connection of the UE in the MME, the MME shall locally deactivate all EPS bearer contexts associated to the PDN connection with the default EPS bearer context without peer-to-peer ESM signalling to the UE. If the default bearer is associated with the last remaining PDN connection of the UE in the MME, and EMM-REGISTERED without PDN connection is supported by the UE and the MME, the MME shall locally deactivate all EPS bearer contexts associated to the PDN connection with the default EPS bearer context without peer-to-peer ESM signalling to the UE.

If the EPS bearer context status IE is included in the TRACKING AREA UPDATE REQUEST, the MME shall include an EPS bearer context status IE in the TRACKING AREA UPDATE ACCEPT message, indicating which EPS bearer contexts are active in the MME except for the case no EPS bearer context exists on the network side.

If the EPS update type IE included in the TRACKING AREA UPDATE REQUEST message indicates "periodic updating", and the UE was previously successfully attached for EPS and non-EPS services, subject to operator policies the MME should allocate a TAI list that does not span more than one location area.

The MME shall indicate "combined TA/LA updated" or "combined TA/LA updated and ISR activated" in the EPS update result IE in the TRACKING AREA UPDATE ACCEPT message, if the following conditions apply:

- the EPS update type IE included in the TRACKING AREA UPDATE REQUEST message indicates "periodic updating" and the UE was previously successfully attached for EPS and non-EPS services; and

- location area updating for non-EPS services as specified in 3GPP TS 29.118 [16A] is successful.

The MME may include T3412 extended value IE in the TRACKING AREA UPDATE ACCEPT message only if the UE indicates support of the extended periodic timer T3412 in the MS network feature support IE in the TRACKING AREA UPDATE REQUEST message.

The MME shall include the T3324 value IE in the TRACKING AREA UPDATE ACCEPT message only if the T3324 value IE was included in the TRACKING AREA UPDATE REQUEST message, and the MME supports and accepts the use of PSM.

If the MME supports and accepts the use of PSM, and the UE included the T3412extended value IE in the TRACKING AREA UPDATE REQUEST message, then the MME shall take into account the T3412 value requested when providing the T3412 value IE and the T3412 extended value IE in the TRACKING AREA UPDATE ACCEPT message.

NOTE 5: Besides the value requested by the MS, the MME can take local configuration or subscription data provided by the HSS into account when selecting a value for T3412 (see 3GPP TS 23.401 [10] subclause 4.3.17.3).

If the MME includes the T3324 value IE indicating a value other than deactivated in the TRACKING AREA UPDATE ACCEPT message, then the MME shall indicate in the EPS update result IE in the TRACKING AREA UPDATE ACCEPT message that ISR is not activated.

Also, during the tracking area updating procedure without the "active" flag set, if the MME has deactivated EPS bearer context(s) locally for any reason, the MME shall inform the UE of the deactivated EPS bearer context(s) by including the EPS bearer context status IE in the TRACKING AREA UPDATE ACCEPT message.

Also, during the tracking area updating procedure with the "active" flag set, if the MME has deactivated EPS bearer context(s) associated with control plane only indication locally for any reason, the MME shall inform the UE of the deactivated EPS bearer context(s) by including the EPS bearer context status IE in the TRACKING AREA UPDATE ACCEPT message.

If the TRACKING AREA UPDATE ACCEPT message contains the DCN-ID IE, then the UE shall store the included DCN-ID value together with the PLMN code of the registered PLMN in a DCN-ID list in a non-volatile memory in the ME as specified in annex C.

If due to regional subscription restrictions or access restrictions the UE is not allowed to access the TA, but it has a PDN connection for emergency bearer services established, the MME may accept the TRACKING AREA UPDATE REQUEST message and deactivate all non-emergency EPS bearer contexts by initiating an EPS bearer context deactivation procedure when the tracking area updating procedure is initiated in EMM-CONNECTED mode. When the tracking area updating procedure is initiated in EMM-IDLE mode, the MME locally deactivates all non-emergency EPS bearer contexts and informs the UE via the EPS bearer context status IE in the TRACKING AREA UPDATE ACCEPT message. The MME shall not deactivate the emergency EPS bearer contexts. The network shall consider the UE to be attached for emergency bearer services only and shall indicate in the EPS update result IE in the TRACKING AREA UPDATE ACCEPT message that ISR is not activated.

If a TRACKING AREA UPDATE REQUEST message is received from a UE with a LIPA PDN connection, and if:

- a GW Transport Layer Address IE value identifying a L-GW is provided by the lower layer together with the TRACKING AREA UPDATE REQUEST message, and the P-GW address included in the EPS bearer context of the LIPA PDN Connection is different from the provided GW Transport Layer Address IE value (see 3GPP TS 36.413 [23]); or

- no GW Transport Layer Address is provided together with the TRACKING AREA UPDATE REQUEST message by the lower layer,

then the MME locally deactivates all EPS bearer contexts associated with the LIPA PDN connection. Furthermore, the MME takes one of the following actions:

- if no active EPS bearer contexts remain for the UE, the MME shall not accept the tracking area update request as specified in subclause 5.5.3.2.5;

- if active EPS bearer contexts remain for the UE and the TRACKING AREA UPDATE REQUEST message is accepted, the MME informs the UE via the EPS bearer context status IE in the TRACKING AREA UPDATE ACCEPT message that EPS bearer contexts were locally deactivated.

If a TRACKING AREA UPDATE REQUEST message is received from a UE with a SIPTO at the local network PDN connection, is accepted by the network, the following different cases can be distinguished:

1) If the PDN connection is a SIPTO at the local network PDN connection with collocated L-GW and if:

- a SIPTO L-GW Transport Layer Address IE value identifying a L-GW is provided by the lower layer together with the TRACKING AREA UPDATE REQUEST message, and the P-GW address included in the EPS bearer context of the SIPTO at the local network PDN connection is different from the provided SIPTO L-GW Transport Layer Address IE value (see 3GPP TS 36.413 [23]); or

- no SIPTO L-GW Transport Layer Address is provided together with the TRACKING AREA UPDATE REQUEST message by the lower layer,

2) If the PDN connection is a SIPTO at the local network PDN connection with stand-alone GW and if:

- a LHN-ID value is provided by the lower layer together with the TRACKING AREA UPDATE REQUEST message, and the LHN-ID stored in the EPS bearer context of the SIPTO at the local network PDN connection is different from the provided LHN-ID value (see 3GPP TS 36.413 [23]); or

- no LHN-ID value is provided together with the TRACKING AREA UPDATE REQUEST message by the lower layer,

then the MME takes one of the following actions:

- if the SIPTO at the local network PDN connection is the last remaining PDN connection for the UE, and EMM-REGISTERED without PDN connection is not supported by the UE or the MME, then the MME shall upon completion of the tracking area updating procedure detach the UE by using detach type "re-attach required" (see subclause 5.5.2.3.1);

- if the SIPTO at the local network PDN connection is the last remaining PDN connection for the UE, and EMM-REGISTERED without PDN connection is supported by the UE and the MME, then the MME shall upon completion of the tracking area updating procedure initiate an EPS bearer context deactivation procedure with ESM cause #39 "reactivation requested" for the default EPS bearer context of the SIPTO at the local network PDN connection (see subclause 6.4.4.2); and

- if a PDN connection remains that is not SIPTO at the local network PDN connection, the MME shall upon completion of the tracking area updating procedure initiate an EPS bearer context deactivation procedure with ESM cause #39 "reactivation requested" for the default EPS bearer context of each SIPTO at the local network PDN connection (see subclause 6.4.4.2);

For a SIPTO at the local network PDN connection with stand-alone GW, the conditions to deactivate ISR are specified in 3GPP TS 23.401 [10], subclause 4.3.5.6.

For a shared network, the TAIs included in the TAI list can contain different PLMN identities. The MME indicates the selected core network operator PLMN identity to the UE in the GUTI (see 3GPP TS 23.251 [8B]).

If the "active" flag is set in the TRACKING AREA UPDATE REQUEST message and control plane CIoT EPS optimization is not used by the MME, the MME shall re-establish the radio and S1 bearers for all active EPS bearer contexts. If the "active" flag is set in the TRACKING AREA UPDATE REQUEST message and control plane CIoT EPS optimization is used by the MME, the MME shall re-establish the radio and S1 bearers for all active EPS bearer contexts associated with PDN connections established without Control plane only indication.

If the "signalling active" flag is set in the TRACKING AREA UPDATE REQUEST message and control plane CIoT EPS optimization is used by the MME, the MME shall not immediately release the NAS signalling connection after the completion of the tracking area updating procedure.

If the "active" flag is not set in the TRACKING AREA UPDATE REQUEST message and control plane CIoT EPS optimization is not used by the MME, the MME may also re-establish the radio and S1 bearers for all active EPS bearer contexts due to downlink pending data or downlink pending signalling, except for the case when the TRACKING AREA UPDATE REQUEST message includes the UE request type IE and the Request type is set to "NAS signalling connection release requested". If the "active" flag is not set in the TRACKING AREA UPDATE REQUEST message and control plane CIoT EPS optimization is used by the MME, the MME may also re-establish the radio and S1 bearers for all active EPS bearer contexts associated with PDN connections established without Control plane only indication due to downlink pending data or downlink pending signalling, except for the case when the TRACKING AREA UPDATE REQUEST message includes the UE request type IE and the Request type is set to "NAS signalling connection release requested".

If the MME supports NB-S1 mode, Non-IP or Ethernet PDN type, inter-system change with 5GS, or the network wants to enforce the use of DNS over (D)TLS (see 3GPP TS 33.501 [24]), then the MME shall support the extended protocol configuration options IE.

NOTE 6: Support of DNS over (D)TLS is based on the informative requirements as specified in 3GPP TS 33.401 [19] and it is implemented based on the operator requirement.

If the MME supports the extended protocol configuration options IE and the UE indicated support of the extended protocol configuration options IE, then the MME shall set the ePCO bit to "extended protocol configuration options supported" in the EPS network feature support IE of the TRACKING AREA UPDATE ACCEPT message.

If the UE indicates support for restriction on use of enhanced coverage in the TRACKING AREA UPDATE REQUEST message, and the network decides to restrict the use of enhanced coverage for the UE, then the MME shall set the RestrictEC bit to "Use of enhanced coverage is restricted" in the EPS network feature support IE of the TRACKING AREA UPDATE ACCEPT message.

The MME may indicate the header compression configuration status IE in the TRACKING AREA UPDATE ACCEPT message for each established EPS bearer context using control plane CIoT EPS optimisation.

If the UE has indicated support for the control plane data back-off timer, and the MME decides to activate the congestion control for transport of user data via the control plane, then the MME shall include the T3448 value IE in the TRACKING AREA UPDATE ACCEPT message.

If the UE indicates support for dual connectivity with NR in the TRACKING AREA UPDATE REQUEST message, and the MME decides to restrict the use of dual connectivity with NR for the UE, then the MME shall set the RestrictDCNR bit to "Use of dual connectivity with NR is restricted" in the EPS network feature support IE of the TRACKING AREA UPDATE ACCEPT message.

If the UE indicates support for N1 mode in the TRACKING AREA UPDATE REQUEST message and the MME supports inter-system interworking with 5GS, the MME may set the IWK N26 bit to either:

- "interworking without N26 interface not supported" if the MME supports N26 interface; or

- "interworking without N26 interface supported" if the MME does not support N26 interface

in the EPS network feature support IE in the TRACKING AREA UPDATE ACCEPT message.

If due to operator policies unsecured redirection to a GERAN cell is not allowed in the current PLMN, the MME shall set the redir-policy bit to "Unsecured redirection to GERAN not allowed" in the Network policy IE of the TRACKING AREA UPDATE ACCEPT message.

If the UE has indicated support for service gap control, a service gap time value is available in the EMM context, the MME may include the T3447 value IE set to the service gap time value in the TRACKING AREA UPDATE ACCEPT message.

If the network supports signalling for a maximum number of 15 EPS bearer contexts and the UE indicated support of signalling for a maximum number of 15 EPS bearer contexts in the TRACKING AREA UPDATE REQUEST message, then the MME shall set the 15 bearers bit to "Signalling for a maximum number of 15 EPS bearer contexts supported" in the EPS network feature support IE of the TRACKING AREA UPDATE ACCEPT message.

If the UE requests ciphering keys for ciphered broadcast assistance data in the TRACKING AREA UPDATE REQUEST message and the MME has valid ciphering key data applicable to the UE's subscription, then the MME shall include the ciphering key data in the Ciphering key data IE of the TRACKING AREA UPDATE ACCEPT message.

If the UE supporting MUSIM in the TRACKING AREA UPDATE REQUEST message, requests the release of the NAS signalling connection, by setting Request type to "NAS signalling connection release requested" in the UE request type IE, and if the UE,

- requests restriction of paging by including the Paging restriction IE, the MME shall store the paging restriction preferences of the UE and enforce these restrictions in the paging procedure as described in clause 5.6.2; or

- does not request any restriction of paging by not including the Paging restriction IE, the MME shall delete any stored paging restriction preferences for the UE and stop restricting paging; and

initiate the release of the NAS signalling connection after the completion of the tracking area updating procedure.

Upon receiving a TRACKING AREA UPDATE ACCEPT message, the UE shall stop timer T3430, reset the service request attempt counter, tracking area updating attempt counter, enter state EMM-REGISTERED and set the EPS update status to EU1 UPDATED. If the message contains a GUTI, the UE shall use this GUTI as new temporary identity for EPS services and shall store the new GUTI. If no GUTI was included by the MME in the TRACKING AREA UPDATE ACCEPT message, the old GUTI shall be used. If the UE receives a new TAI list in the TRACKING AREA UPDATE ACCEPT message, the UE shall consider the new TAI list as valid and the old TAI list as invalid; otherwise, the UE shall consider the old TAI list as valid.

If the UE receives the TRACKING AREA UPDATE ACCEPT message from a PLMN for which a PLMN-specific attempt counter or PLMN-specific PS-attempt counter is maintained (see subclause 5.3.7b), then the UE shall reset these counters. If the UE maintains a counter for "SIM/USIM considered invalid for GPRS services", then the UE shall reset this counter.

If the TRACKING AREA UPDATE ACCEPT message contains the T3412 extended value IE, then the UE shall use the T3412 extended value IE as periodic tracking area update timer (T3412). If the TRACKING AREA UPDATE ACCEPT contains T3412 value IE, but not T3412 extended value IE, then the UE shall use value in T3412 value IE as periodic tracking area update timer (T3412). If neither T3412 value IE nor T3412 extended value IE is included, the UE shall use the value currently stored, e.g. from a prior ATTACH ACCEPT or TRACKING AREA UPDATE ACCEPT message.

If the TRACKING AREA UPDATE ACCEPT message contains the T3324 value IE, then the UE shall use the timer value for T3324 as specified in 3GPP TS 24.008 [13], subclause 4.7.2.8.

If the UE had initiated the tracking area updating procedure in EMM-IDLE mode to perform an inter-system change from A/Gb mode or Iu mode to S1 mode and the nonceUE was included in the TRACKING AREA UPDATE REQUEST message, the UE shall delete the nonceUE upon receipt of the TRACKING AREA UPDATE ACCEPT message.

If an EPS bearer context status IE is included in the TRACKING AREA UPDATE ACCEPT message, the UE shall deactivate all those EPS bearers contexts locally (without peer-to-peer signalling between the UE and the MME) which are active in the UE, but are indicated by the MME as being inactive. If a default EPS bearer context is marked as inactive in the EPS bearer context status IE included in the TRACKING AREA UPDATE ACCEPT message, and this default bearer is not associated with the last remaining PDN connection in the UE, the UE shall locally deactivate all EPS bearer contexts associated to the PDN connection with the default EPS bearer context without peer-to-peer ESM signalling to the MME. If only the PDN connection for emergency bearer services remains established, the UE shall consider itself attached for emergency bearer services only. If the default bearer is associated with the last remaining PDN connection of the UE in the MME, and EMM-REGISTERED without PDN connection is supported by the UE and the MME, the UE shall locally deactivate all EPS bearer contexts associated to the PDN connection with the default EPS bearer context without peer-to-peer ESM signalling to the UE.

If an EPS bearer context status IE is included in the TRACKING AREA UPDATE ACCEPT message, the UE may choose to ignore all those EPS bearers which are indicated by the MME as being active but are inactive at the UE.

The MME may also include a list of equivalent PLMNs in the TRACKING AREA UPDATE ACCEPT message. Each entry in the list contains a PLMN code (MCC+MNC). The UE shall store the list as provided by the network, and if there is no PDN connection for emergency bearer services or PDN connection for RLOS established, the UE shall remove from the list any PLMN code that is already in the list of "forbidden PLMNs" or in the list of "forbidden PLMNs for GPRS service". If the UE is not attached for emergency bearer services and there is a PDN connection for emergency bearer services established, the UE shall remove from the list of equivalent PLMNs any PLMN code present in the list of forbidden PLMNs or in the list of "forbidden PLMNs for GPRS service" when the PDN connection for emergency bearer services is released. In addition, the UE shall add to the stored list the PLMN code of the registered PLMN that sent the list. The UE shall replace the stored list on each receipt of the TRACKING AREA UPDATE ACCEPT message. If the TRACKING AREA UPDATE ACCEPT message does not contain a list, then the UE shall delete the stored list.

If the UE is neither attached for emergency bearer services nor attached for access to RLOS, and if the PLMN identity of the registered PLMN is a member of the list of "forbidden PLMNs" or the list of "forbidden PLMNs for GPRS service", any such PLMN identity shall be deleted from the corresponding list(s).

The network may also indicate in the EPS update result IE in the TRACKING AREA UPDATE ACCEPT message that ISR is active. If the UE is attached for emergency bearer services, the network shall indicate in the EPS update result IE in the TRACKING AREA UPDATE ACCEPT message that ISR is not activated. If the TRACKING AREA UPDATE ACCEPT message contains:

i) no indication that ISR is activated, the UE shall set the TIN to "GUTI" and shall stop the periodic routing area update timer T3312 or T3323, if running;

ii) an indication that ISR is activated, then:

- if the UE is required to perform routing area updating for IMS voice termination as specified in 3GPP TS 24.008 [13], annex P.5, the UE shall set the TIN to "GUTI" and shall stop the periodic routing area update timer T3312 or T3323, if running;

- if the UE had initiated the tracking area updating procedure due to a change in UE network capability or change in DRX parameters, the UE shall set the TIN to "GUTI" and shall stop the periodic routing area update timer T3312 or T3323, if running;

- if the UE had initiated the tracking area updating procedure due to a change in the UE's usage setting or the voice domain preference for E-UTRAN, the UE shall set the TIN to "GUTI" and shall stop the periodic routing area update timer T3312 or T3323, if running; or

- the UE shall regard a previously assigned P-TMSI and RAI as valid and registered with the network. If the TIN currently indicates "P-TMSI" and the periodic routing area update timer T3312 is running or is deactivated, the UE shall set the TIN to "RAT-related TMSI". If the TIN currently indicates "P-TMSI" and the periodic routing area update timer T3312 has already expired, the UE shall set the TIN to "GUTI".

The network informs the UE about the support of specific features, such as IMS voice over PS session, location services (EPC-LCS, CS-LCS), emergency bearer services, or CIoT EPS optimizations, in the EPS network feature support information element. In a UE with IMS voice over PS capability, the IMS voice over PS session indicator and the emergency bearer services indicator shall be provided to the upper layers. The upper layers take the IMS voice over PS session indicator into account as specified in 3GPP TS 23.221 [8A], subclause 7.2a and subclause 7.2b, when selecting the access domain for voice sessions or calls. When initiating an emergency call, the upper layers also take both the IMS voice over PS session indicator and the emergency bearer services indicator into account for the access domain selection. When the UE determines via the IMS voice over PS session indicator that the network does not support IMS voice over PS sessions in S1 mode, then the UE shall not locally release any persistent EPS bearer context. When the UE determines via the emergency bearer services indicator that the network does not support emergency bearer services in S1 mode, then the UE shall not locally release any emergency EPS bearer context if there is a radio bearer associated with that context. In a UE with LCS capability, location services indicators (EPC-LCS, CS-LCS) shall be provided to the upper layers. When MO-LR procedure is triggered by the UE's application, those indicators are taken into account as specified in 3GPP TS 24.171 [13C].

If the RestrictDCNR bit is set to "Use of dual connectivity with NR is restricted" in the EPS network feature support IE of the TRACKING AREA UPDATE ACCEPT message, the UE shall provide the indication that dual connectivity with NR is restricted to the upper layers.

The UE supporting N1 mode shall operate in the mode for inter-system interworking with 5GS as follows:

- if the IWK N26 bit in the EPS network feature support IE is set to "interworking without N26 interface not supported", the UE shall operate in single-registration mode;

- if the IWK N26 bit in the EPS network feature support IE is set to "interworking without N26 interface supported" and the UE supports dual-registration mode, the UE may operate in dual-registration mode; or

NOTE 7: The registration mode used by the UE is implementation dependent.

- if the IWK N26 bit in the EPS network feature support IE is set to "interworking without N26 interface supported" and the UE only supports single-registration mode, the UE shall operate in single-registration mode.

The UE shall treat the interworking without N26 interface indicator as valid in the entire PLMN and equivalent PLMNs. The interworking procedures required for coordination between 5GMM and EMM without N26 interface are specified in 3GPP TS 24.501 [54].

If the redir-policy bit is set to "Unsecured redirection to GERAN not allowed" in the Network policy IE of the TRACKING AREA UPDATE ACCEPT message, the UE shall set the network policy on unsecured redirection to GERAN for the current PLMN to "Unsecured redirection to GERAN not allowed" and indicate to the lower layers that unsecured redirection to a GERAN cell is not allowed. If the redir-policy bit is set to "Unsecured redirection to GERAN allowed" or if the Network policy IE is not included in the TRACKING AREA UPDATE ACCEPT message, the UE shall set the network policy on unsecured redirection to GERAN for the current PLMN to "Unsecured redirection to GERAN allowed" and indicate to the lower layers that unsecured redirection to a GERAN cell is allowed. The UE shall set the network policy on unsecured redirection to GERAN to "Unsecured redirection to GERAN not allowed" and indicate this to the lower layers when any of the following events occurs:

- the UE initiates an EPS attach or tracking area updating procedure in a PLMN different from the PLMN where the UE performed the last successful EPS attach or tracking area updating procedure;

- the UE is switched on; or

- the UICC containing the USIM is removed.

If the UE has initiated the tracking area updating procedure due to manual CSG selection and receives a TRACKING AREA UPDATE ACCEPT message, and the UE sent the TRACKING AREA UPDATE REQUEST message in a CSG cell, the UE shall check if the CSG ID and associated PLMN identity of the cell where the UE has sent the TRACKING AREA UPDATE REQUEST message are contained in the Allowed CSG list. If not, the UE shall add that CSG ID and associated PLMN identity to the Allowed CSG list and the UE may add the HNB Name (if provided by lower layers) to the Allowed CSG list if the HNB Name is present in neither the Operator CSG list nor the Allowed CSG list.

If the TRACKING AREA UPDATE ACCEPT message contained a GUTI, the UE shall return a TRACKING AREA UPDATE COMPLETE message to the MME to acknowledge the received GUTI.

If the UE which was previously successfully attached for EPS and non-EPS services receives the TRACKING AREA UPDATE ACCEPT message with EPS update result IE indicating "combined TA/LA updated" or "combined TA/LA updated and ISR activated" as the response of the TRACKING AREA UPDATE REQUEST message with EPS update type IE indicating "periodic updating", the UE shall behave as follows:

- If the TRACKING AREA UPDATE ACCEPT message contains an IMSI, the UE is not allocated any TMSI, and shall delete any old TMSI accordingly.

- If the TRACKING AREA UPDATE ACCEPT message contains a TMSI, the UE shall use this TMSI as new temporary identity. The UE shall delete its old TMSI and shall store the new TMSI. In this case, a TRACKING AREA UPDATE COMPLETE message is returned to the network to confirm the received TMSI.

- If neither a TMSI nor an IMSI has been included by the network in the TRACKING AREA UPDATE ACCEPT message, the old TMSI, if any is available, shall be kept.

If the header compression configuration status is included in the TRACKING AREA UPDATE ACCEPT message, the UE shall stop using header compression and decompression for those EPS bearers using Control plane CIoT EPS optimisation for which the MME indicated that the header compression configuration is not used.

If the T3448 value IE is present in the received TRACKING AREA UPDATE ACCEPT message, the UE shall:

- stop timer T3448 if it is running; and

- start timer T3448 with the value provided in the T3448 value IE.

If the UE is using EPS services with control plane CIoT EPS optimization, the T3448 value IE is present in the TRACKING AREA UPDATE ACCEPT message and the value indicates that this timer is either zero or deactivated, the UE shall consider this case as an abnormal case and proceed as if the T3448 value IE is not present.

If the UE in EMM-IDLE mode initiated the tracking area updating procedure and the TRACKING AREA UPDATE ACCEPT message does not include the T3448 value IE and if timer T3448 is running, then the UE shall stop timer T3448.

If the UE has indicated "service gap control supported" in the TRACKING AREA UPDATE REQUEST message and:

- the TRACKING AREA UPDATE ACCEPT message contains the T3447 value IE, then the UE shall store the new T3447 value, erase any previous stored T3447 value if exists and use the new T3447 value with the T3447 timer next time it is started; or

- the TRACKING AREA UPDATE ACCEPT message does not contain the T3447 value IE, then the UE shall erase any previous stored T3447 value if exists and stop the T3447 timer if running.

Upon receiving a TRACKING AREA UPDATE COMPLETE message, the MME shall stop timer T3450 and change to state EMM-REGISTERED. The GUTI, if sent in the TRACKING AREA UPDATE ACCEPT message, shall be considered as valid.

NOTE 8: Upon receiving a TRACKING AREA UPDATE COMPLETE message, if a new TMSI was included in the TRACKING AREA UPDATE ACCEPT message, the MME sends an SGsAP-TMSI-REALLOCATION-COMPLETE message as specified in 3GPP TS 29.118 [16A].

For inter-system change from A/Gb mode to S1 mode or Iu mode to S1 mode in EMM-IDLE mode, if the UE has included an eKSI in the NAS Key Set Identifier IE indicating a current EPS security context in the TRACKING AREA UPDATE REQUEST message by which the TRACKING AREA UPDATE REQUEST message is integrity protected, the MME shall take one of the following actions:

- if the MME retrieves the current EPS security context as indicated by the eKSI and GUTI sent by the UE, the MME shall integrity check the TRACKING AREA UPDATE REQUEST message using the current EPS security context and integrity protect the TRACKING AREA UPDATE ACCEPT message using the current EPS security context;

- if the MME cannot retrieve the current EPS security context as indicated by the eKSI and GUTI sent by the UE, and if the UE has included a valid GPRS ciphering key sequence number, the MME shall create a new mapped EPS security context as specified in 3GPP TS 33.401 [19], and then perform a security mode control procedure to indicate the use of the new mapped EPS security context to the UE (see subclause 5.4.3.2); or

- if the UE has not included an Additional GUTI IE, the MME may treat the TRACKING AREA UPDATE REQUEST message as in the previous item, i.e. as if it cannot retrieve the current EPS security context.

NOTE 9: The handling described above at failure to retrieve the current EPS security context or if no Additional GUTI IE was provided does not preclude the option for the MME to perform an EPS authentication procedure and create a new native EPS security context.

For inter-system change from A/Gb mode to S1 mode or Iu mode to S1 mode in EMM-IDLE mode, if the UE has not included a valid eKSI in the NAS Key Set Identifier IE and has included a valid GPRS ciphering key sequence number in the TRACKING AREA UPDATE REQUEST message, the MME shall create a new mapped EPS security context as specified in 3GPP TS 33.401 [19], and then perform a security mode control procedure to indicate the use of the new mapped EPS security context to the UE (see subclause 5.4.3.2).

NOTE 10: This does not preclude the option for the MME to perform an EPS authentication procedure and create a new native EPS security context.

For inter-system change from N1 mode to S1 mode in EMM-IDLE mode, if the UE has included an eKSI in the NAS Key Set Identifier IE indicating a 5G NAS security context in the TRACKING AREA UPDATE REQUEST message by which the TRACKING AREA UPDATE REQUEST message is integrity protected, the MME shall take actions as specified in subclause 4.4.2.3.

For inter-system change from A/Gb mode to S1 mode or Iu mode to S1 mode in EMM-CONNECTED mode, the MME shall integrity check TRACKING AREA UPDATE REQUEST message using the current K'ASME as derived when triggering the handover to E-UTRAN (see subclause 4.4.2.2). The MME shall verify the received UE security capabilities in the TRACKING AREA UPDATE REQUEST message. The MME shall then take one of the following actions:

- if the TRACKING AREA UPDATE REQUEST does not contain a valid KSIASME in the Non-current native NAS key set identifier IE, the MME shall remove the non-current native EPS security context, if any, for any GUTI for this UE. The MME shall then integrity protect and cipher the TRACKING AREA UPDATE ACCEPT message using the security context based on K'ASME and take the mapped EPS security context into use; or

- if the TRACKING AREA UPDATE REQUEST contains a valid KSIASME in the Non-current native NAS key set identifier IE, the MME may initiate a security mode control procedure to take the corresponding native EPS security context into use.

For inter-system change from N1 mode to S1 mode in EMM-CONNECTED mode, the MME shall integrity check TRACKING AREA UPDATE REQUEST message using the current K'ASME as derived when triggering the handover to E-UTRAN (see subclause 4.4.2.2). The MME shall verify the received UE security capabilities in the TRACKING AREA UPDATE REQUEST message. The MME shall then take one of the following actions:

- if the TRACKING AREA UPDATE REQUEST does not contain a valid KSIASME in the Non-current native NAS key set identifier IE, the MME shall remove the non-current native EPS security context, if any, for any GUTI for this UE. The MME shall then integrity protect and cipher the TRACKING AREA UPDATE ACCEPT message using the security context based on K'ASME and take the mapped EPS security context into use; or

- if the TRACKING AREA UPDATE REQUEST contains a valid KSIASME in the Non-current native NAS key set identifier IE, the MME may initiate a security mode control procedure to take the corresponding native EPS security context into use.

In WB-S1 mode, if the UE has set the RACS bit to "RACS supported" in the UE network capability IE of the TRACKING AREA UPDATE REQUEST message, the MME may include a UE radio capability ID IE or a UE radio capability ID deletion indication IE in the TRACKING AREA UPDATE ACCEPT message. In this case the MME shall enter state EMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.4.1.

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

a) delete any network-assigned UE radio capability IDs associated with the registered PLMN stored at the UE;

b) send a TRACKING AREA UPDATE COMPLETE message to the network to acknowledge the received UE radio capability ID deletion indication IE; and

c) after the completion of the ongoing tracking area updating procedure, initiate a tracking area updating procedure as specified in subclause 5.5.3 over the existing NAS signalling connection; and

- a UE radio capability ID IE, the UE shall:

a) store the UE radio capability ID as specified in annex C; and

b) send a TRACKING AREA UPDATE COMPLETE message to the network to acknowledge the received UE radio capability ID IE.

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

### 5.6.1 Service request procedure

#### 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; or

- to indicate to the network that the UE supporting MUSIM requests the release of the NAS signalling connection or reject paging due to activity on another USIM.

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 subclause 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]);

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]); or

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 UE supports MUSIM, in EMM-CONNECTED mode requests the network to release the NAS signalling connection and optionally includes paging restrictions due to activity on another USIM; or

p) the UE supports MUSIM, in EMM-IDLE mode when responding to paging requests the network to reject paging, release the NAS signalling connection unless it is unable to do so, and optionally includes paging restrictions due to activity on another USIM.

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.



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 subclause 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 subclause 5.6.1.5 or subclause 5.3.7b; or

- the UE moves to EMM-DEREGISTERED state.

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

#### 5.6.1.2 Service request procedure initiation

##### 5.6.1.2.1 UE is not using EPS services with control plane CIoT EPS optimization

For cases a, b, c, h, k and l in subclause 5.6.1.1:

- if the UE is not configured for NAS signalling low priority, the UE initiates the service request procedure by sending a SERVICE REQUEST message to the MME;

- if the UE is configured for NAS signalling low priority, and the last received ATTACH ACCEPT message or TRACKING AREA UPDATE ACCEPT message from the network indicated that the network supports use of EXTENDED SERVICE REQUEST for packet services, the UE shall send an EXTENDED SERVICE REQUEST message with service type set to "packet services via S1"; or

NOTE: A UE configured for dual priority is configured for NAS signalling low priority indicator.

- if the UE is configured for NAS signalling low priority and the last received ATTACH ACCEPT message or TRACKING AREA UPDATE ACCEPT message from the network did not indicate that the network supports use of EXTENDED SERVICE REQUEST for packet services, the UE shall instead send a SERVICE REQUEST message.

For cases a, b, c, h, k and l in subclause 5.6.1.1, after sending the SERVICE REQUEST message or the EXTENDED SERVICE REQUEST message with service type set to "packet services via S1", the UE shall start T3417 and enter the state EMM-SERVICE-REQUEST-INITIATED.

For case d in subclause 5.6.1.1, the UE shall send an EXTENDED SERVICE REQUEST message, start T3417ext and enter the state EMM-SERVICE-REQUEST-INITIATED.

For case e in subclause 5.6.1.1:

- if the UE is in EMM-IDLE mode, the UE shall send an EXTENDED SERVICE REQUEST message, start T3417ext-mt and enter the state EMM-SERVICE-REQUEST-INITIATED;

- if the UE is in EMM-CONNECTED mode and if the UE accepts the paging, the UE shall send an EXTENDED SERVICE REQUEST message with the CSFB response IE indicating "CS fallback accepted by the UE", start T3417ext-mt and enter the state EMM-SERVICE-REQUEST-INITIATED; or

- if the UE is in EMM-CONNECTED mode and if the UE rejects the paging, the UE shall send an EXTENDED SERVICE REQUEST message with the CSFB response IE indicating "CS fallback rejected by the UE" and enter the state EMM-REGISTERED.NORMAL-SERVICE. The network shall not initiate CS fallback procedures.

For cases f, g, i and j in subclause 5.6.1.1, the UE shall send an EXTENDED SERVICE REQUEST message, start T3417 and enter the state EMM-SERVICE-REQUEST-INITIATED.

For cases o and p in subclause 5.6.1.1, the UE shall send an EXTENDED SERVICE REQUEST message,

- for case o in subclause 5.6.1.1, set Request type to "NAS signalling connection release requested" in the UE request type IE and Service type to "packet services via S1"; or

- for case p in subclause 5.6.1.1, set Request type to "Rejection of paging requested" in the UE request type IE and Service type to "packet services via S1" if the UE needs to reject PS paging or to "mobile terminating CS fallback or 1xCS fallback" if the UE needs to reject CS paging; and

start T3417, enter the state EMM-SERVICE-REQUEST-INITIATED and may include its paging restriction preferences in the Paging restriction IE in the EXTENDED SERVICE REQUEST message.

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

##### 5.6.1.2.2 UE is using EPS services with control plane CIoT EPS optimization

The UE shall send a CONTROL PLANE SERVICE REQUEST message, start T3417 and enter the state EMM-SERVICE-REQUEST-INITIATED.

For case a in subclause 5.6.1.1, the Control plane service type of the CONTROL PLANE SERVICE REQUEST message shall indicate "mobile terminating request". The UE may include the ESM DATA TRANSPORT message. The UE shall not include any ESM message other than ESM DATA TRANSPORT message.

For case b in subclause 5.6.1.1,

- if the UE has pending IP, non-IP or Ethernet user data that is to be sent via the control plane radio bearers, the Control plane service type of the CONTROL PLANE SERVICE REQUEST message shall indicate "mobile originating request". The UE shall include an ESM DATA TRANSPORT message in the ESM message container IE. If the UE supports the CP-EDT (see 3GPP TS 36.300 [20]), the UE shall provide the CONTROL PLANE SERVICE REQUEST message in the NAS request to the lower layer to establish a RRC connection as specified in subclause 5.3.1.1.

For cases b and m in subclause 5.6.1.1,

- if the UE has pending IP, non-IP or Ethernet user data that is to be sent via the user plane radio bearers, the UE shall set the Control plane service type of the CONTROL PLANE SERVICE REQUEST message to "mobile originating request" and the "active" flag in the Control plane service type IE to 1. The UE shall not include any ESM message container or NAS message container IE in the CONTROL PLANE SERVICE REQUEST message.

For case c in subclause 5.6.1.1, the UE shall set the Control plane service type of the CONTROL PLANE SERVICE REQUEST message to "mobile originating request". If the CONTROL PLANE SERVICE REQUEST message is:

- for sending SMS , the UE shall include the SMS message in the NAS message container IE and shall not include any ESM message container IE in the CONTROL PLANE SERVICE REQUEST message; and

- for sending signalling different from SMS, the UE shall not include any ESM message container or NAS message container IE in the CONTROL PLANE SERVICE REQUEST message.

For cases o and p in subclause 5.6.1.1, the UE shall send the CONTROL PLANE SERVICE REQUEST message with the Control plane service type IE set to "mobile originating request",

- for case o in subclause 5.6.1.1 set Request type to "NAS signalling connection release requested" in the UE request type IE; or

- for case p in subclause 5.6.1.1 set Request type to "Rejection of paging requested" in the UE request type IE; and

start T3417 and enter the state EMM-SERVICE-REQUEST-INITIATED. Further, the UE may include its paging restriction preferences in the Paging restriction IE in the CONTROL PLANE SERVICE REQUEST message and shall not include any ESM message container or NAS message container IE in the CONTROL PLANE SERVICE REQUEST message.

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

#### 5.6.1.4 Service request procedure accepted by the network

##### 5.6.1.4.1 UE is not using EPS services with control plane CIoT EPS optimization

If EMM-REGISTERED without PDN connection is supported by the UE and the MME and the MME has no active EPS bearer contexts for the UE, for cases a, b and c in subclause 5.6.1.1, upon receipt of the SERVICE REQUEST message or the EXTENDED SERVICE REQUEST message for packet services, after completion of the EMM common procedures according to subclause 5.6.1.3, if any, the MME shall send a SERVICE ACCEPT message.

If EMM-REGISTERED without PDN connection is supported by the UE and the MME and the UE has no active EPS bearer contexts, for cases a, b and c in subclause 5.6.1.1, the UE shall treat the receipt of a SERVICE ACCEPT message as successful completion of the procedure. Otherwise, for cases a, b, c, h, k and l in subclause 5.6.1.1, the UE shall treat the indication from the lower layers that the user plane radio bearer is set up as successful completion of the procedure. The UE shall reset the service request attempt counter, stop the timer T3417 and enter the state EMM-REGISTERED.

If the service type information element in the EXTENDED SERVICE REQUEST message indicates "mobile terminating CS fallback or 1xCS fallback" and the CSFB response IE, if included, indicates "CS fallback accepted by the UE", or if the service type information element in the EXTENDED SERVICE REQUEST message indicates "mobile originating CS fallback or 1xCS fallback" or "mobile originating CS fallback emergency call or 1xCS fallback emergency call", the network initiates CS fallback or 1xCS fallback procedures.

If the EPS bearer context status IE is included in the EXTENDED SERVICE REQUEST message, the network shall deactivate all those EPS bearer contexts locally (without peer-to-peer signalling between the network and the UE) which are active on the network side but are indicated by the UE as being inactive. If a default EPS bearer context is marked as inactive in the EPS bearer context status IE included in the EXTENDED SERVICE REQUEST message, and this default bearer is not associated with the last remaining PDN connection of the UE in the MME, the MME shall locally deactivate all EPS bearer contexts associated to the PDN connection with the default EPS bearer context without peer-to-peer ESM signalling to the UE. If the default bearer is associated with the last remaining PDN connection of the UE in the MME, and EMM-REGISTERED without PDN connection is supported by the UE and the MME, the MME shall locally deactivate all EPS bearer contexts associated to the PDN connection with the default EPS bearer context without peer-to-peer ESM signalling to the UE.

If the SERVICE REQUEST message or the EXTENDED SERVICE REQUEST message for packet services, was sent in a CSG cell and the CSG subscription has expired or was removed for a UE, but the UE has a PDN connection for emergency bearer services established, the network shall accept the SERVICE REQUEST message or the EXTENDED SERVICE REQUEST message for packet services and deactivate all non-emergency EPS bearers locally. The emergency EPS bearers shall not be deactivated.

For cases d in subclause 5.6.1.1, and for case e in subclause 5.6.1.1 when the CSFB response was set to "CS fallback accepted by the UE", the UE shall treat the indication from the lower layers that the inter-system change from S1 mode to A/Gb or Iu mode is completed as successful completion of the procedure. The EMM sublayer in the UE shall indicate to the MM sublayer that the CS fallback procedure has succeeded. The UE shall stop the timer T3417ext or T3417ext-mt, respectively, and enter the state EMM-REGISTERED.NO-CELL-AVAILABLE.

If the service request procedure was initiated in EMM-IDLE mode and an EXTENDED SERVICE REQUEST message was sent in a CSG cell and the CSG subscription has expired or was removed for the UE, the network need not perform CSG access control if the service type information element indicates "mobile originating CS fallback emergency call or 1xCS fallback emergency call".

For cases f and g in subclause 5.6.1.1:

- if the UE receives the indication from the lower layers that the signalling connection is released with the redirection indication to cdma2000® 1x access network or the indication from the lower layers that a change to cdma2000® 1x access network for 1xCS fallback has started (see 3GPP TS 36.331 [22]), the UE shall consider the service request procedure successfully completed, stop timer T3417 and enter the state EMM-REGISTERED.NO-CELL-AVAILABLE;

- if the UE receives the dual Rx/Tx redirection indication from the lower layers (see 3GPP TS 36.331 [22]), the UE shall select cdma2000® 1x access network for 1xCS fallback, consider the service request procedure successfully completed, stop timer T3417 and enter the state EMM-REGISTERED.NORMAL-SERVICE; and

- if the UE receives a cdma2000® signalling message indicating 1xCS fallback rejection by cdma2000® 1x access network, the UE shall abort the service request procedure, stop timer T3417 and enter the state EMM-REGISTERED.NORMAL-SERVICE.

For cases i and j in subclause 5.6.1.1, if the UE receives the indication from the lower layers that the signalling connection is released, the UE shall consider the service request procedure successfully completed, stop timer T3417 and enter the state EMM-REGISTERED.NO-CELL-AVAILABLE.

For cases o and p in subclause 5.6.1.1, when the UE supporting MUSIM in the EXTENDED SERVICE REQUEST message sets the Request type to "NAS signalling connection release requested" or to "Rejection of paging requested" in the UE request type IE, and if the UE,

- requests restriction of paging by including the Paging restriction IE, the UE shall treat the receipt of SERVICE ACCEPT message as the successful completion of the procedure; or

- does not request any restriction of paging by not including the Paging restriction IE, the UE shall treat the indication from the lower layers that the RRC connection has been released as the successful completion of the procedure; and

the UE shall reset the service request attempt counter, stop timer T3417 and enter the state EMM-REGISTERED.

If the SERVICE REQUEST message or an EXTENDED SERVICE REQUEST message for packet services was used, the UE shall locally deactivate the EPS bearer contexts that do not have a user plane radio bearer established upon successful completion of the service request procedure, except for the case when the UE supporting MUSIM in the EXTENDED SERVICE REQUEST message sets the Request type to "NAS signalling connection release requested" or to "Rejection of paging requested" in the UE request type IE.

If the EXTENDED SERVICE REQUEST message is for CS fallback or 1xCS fallback and radio bearer establishment takes place during the procedure, the UE shall locally deactivate the EPS bearer contexts that do not have a user plane radio bearer established upon receiving a lower layer indication of radio bearer establishment. The UE does not perform local deactivation of EPS bearer contexts upon receiving an indication of inter-system change from lower layers.

If the EXTENDED SERVICE REQUEST message is for CS fallback or 1xCS fallback and radio bearer establishment does not take place during the procedure, the UE does not perform local deactivation of the EPS bearer context. The UE does not perform local deactivation of EPS bearer contexts upon receiving an indication of inter-system change from lower layers.

If a service request is received from a UE with a LIPA PDN connection, and if:

- a GW Transport Layer Address IE value identifying a L-GW is provided by the lower layer together with the service request, and the P-GW address included in the EPS bearer context of the LIPA PDN connection is different from the provided GW Transport Layer Address IE value (see 3GPP TS 36.413 [23]); or

- no GW Transport Layer Address is provided together with the service request by the lower layer;

then the MME shall locally deactivate all EPS bearer contexts associated with any LIPA PDN connection. Furthermore, if no active EPS bearer contexts remain for the UE, the MME shall not accept the service request as specified in subclause 5.6.1.5.

If a service request is received from a UE with a SIPTO at the local network PDN connection, and if the PDN connection is a:

1) SIPTO at the local network PDN connection with stand-alone GW, and if:

- a LHN-ID value is provided by the lower layer together with the service request, and the LHN-ID value stored in the EPS bearer context of the SIPTO at the local network PDN connection is different from the provided LHN-ID value (see 3GPP TS 36.413 [23]); or

- no LHN-ID value is provided together with the service request by the lower layer; or

2) SIPTO at the local network PDN connection with collocated L-GW, and if:

- a SIPTO L-GW Transport Layer Address IE value identifying a L-GW is provided by the lower layer together with the service request, and the P-GW address included in the EPS bearer context of the SIPTO at the local network PDN connection is different from the provided SIPTO L-GW Transport Layer Address IE value (see 3GPP TS 36.413 [23]); or

- no SIPTO L-GW Transport Layer Address is provided together with the service request by the lower layer;

then, the MME takes one of the following actions:

- if all the remaining PDN connections are SIPTO at the local network PDN connections, the MME shall not accept the service request as specified in subclause 5.6.1.5; and

- if a PDN connection remains that is not SIPTO at the local network PDN connection and the network decides to set up the S1 and radio bearers, the MME shall upon completion of the setup of the S1 bearers initiate an EPS bearer context deactivation procedure with ESM cause #39 "reactivation requested" for the default EPS bearer context of each SIPTO at the local network PDN connection (see subclause 6.4.4.2).

NOTE: For some cases of CS fallback or 1x CS fallback the network can decide not to set up any S1 and radio bearers.

If the UE supporting MUSIM does not include the Paging restriction IE in the EXTENDED SERVICE REQUEST message, the MME shall delete any stored paging restriction preferences for the UE and stop restricting paging.

For cases o and p in subclause 5.6.1.1 when the UE supporting MUSIM sets the Request type to "NAS signalling connection release requested" or to "Rejection of paging requested" in the UE request type IE in the EXTENDED SERVICE REQUEST message, the MME shall not establish radio and S1 bearers for any active EPS bearer contexts and if the UE requests restriction of paging by including the Paging restriction IE, the MME shall store the paging restriction preferences of the UE and enforce these restrictions in the paging procedure as described in clause 5.6.2.

When the E-UTRAN fails to establish radio bearers for one or more EPS bearer contexts, then the MME shall locally deactivate the EPS bearer contexts corresponding to the failed radio bearers based on the lower layer indication from the E‑UTRAN, without notifying the UE.

If the UE is not using EPS services with control plane CIoT EPS optimization, the network shall consider the service request procedure successfully completed in the following cases:

- when it receives an indication from the lower layer that the user plane is setup, if radio bearer establishment is required;

- otherwise when it receives an indication from the lower layer that the UE has been redirected to the other RAT (GERAN or UTRAN in CS fallback, or cdma2000® 1x access network for 1xCS fallback).

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

##### 5.6.1.4.2 UE is using EPS services with control plane CIoT EPS optimization

For case a in subclause 5.6.1.1, upon receipt of the CONTROL PLANE SERVICE REQUEST message with Control plane service type indicating "mobile terminating request", after completion of the EMM common procedures according to subclause 5.6.1.3:

1) if the MME needs to perform an EPS bearer context status synchronization

- for an EPS bearer context associated with Control plane only indication; or

- for an EPS bearer context not associated with Control plane only indication, there is no downlink user data pending to be delivered via the user plane, and the UE did not set the "active" flag in the Control plane service type IE to 1; or

2) if the control plane data back-off time for the UE is stored in MME and the MME decides to deactivate congestion control for transport of user data via the control plane,

then the MME shall send a SERVICE ACCEPT message.

Furthermore the MME may:

1) initiate the transport of user data via the control plane procedure or any other NAS signalling procedure;

2) if supported by the UE and required by the network, initiate the setup of the user plane radio bearer(s); or

3) send a NAS signalling message not related to an EMM common procedure to the UE if downlink signalling is pending.

For case b in subclause 5.6.1.1, upon receipt of the CONTROL PLANE SERVICE REQUEST message with Control plane service type indicating "mobile originating request", after completion of the EMM common procedures according to subclause 5.6.1.3, if any, if the MME needs to perform an EPS bearer context status synchronization

- for an EPS bearer context associated with Control plane only indication; or

- for an EPS bearer context not associated with Control plane only indication, there is no downlink user data pending to be delivered via the user plane, and the UE did not set the "active" flag in the Control plane service type IE to 1,

then the MME shall send a SERVICE ACCEPT message.

Furthermore, the MME may:

1) initiate release of the NAS signalling connection upon receipt of an indication from the ESM layer (see subclause 6.6.4.2), unless the MME has additional downlink user data or signalling pending;

2) initiate the setup of the user plane radio bearer(s), if downlink user data is pending to be delivered via the user plane or the UE has set the "active" flag in the Control plane service type IE to 1;

3) send an ESM DATA TRANSPORT message to the UE, if downlink user data is pending to be delivered via the control plane;

4) send a NAS signalling message not related to an EMM common procedure to the UE if downlink signalling is pending; or

5) send a SERVICE ACCEPT message to complete the service request procedure, if no NAS security mode control procedure was initiated, the MME did not send a SERVICE ACCEPT message as specified above to perform an EPS bearer context status synchronization, and the MME did not initiate any of the procedures specified in item 1 to 4 above.

NOTE 1: The MME can initiate the setup of the user plane radio bearer(s) if the MME decides to activate the congestion control for transport of user data via the control plane.

For case m in subclause 5.6.1.1, upon receipt of the CONTROL PLANE SERVICE REQUEST message with Control plane service type indicating "mobile originating request" and the "active" flag in the Control plane service type IE set to 1:

1) if the MME accepts the request, the MME shall initiate the setup of the user plane radio bearer(s) for all active EPS bearer contexts of SGi PDN connections that are established without control plane only indication.

2) if the MME does not accept the request, the MME shall send a SERVICE ACCEPT message to complete the service request procedure.

NOTE 2: The MME takes into account the maximum number of user plane radio bearers supported by the UE, in addition to local policies and the UE's preferred CIoT network behaviour when deciding whether to accept the request to establish user plane bearer(s) as described in subclause 5.3.15. If the MME accepts the request, all SGi PDN connections are considered as established without Control plane only indication.

NOTE 3: In this release of the specification, a UE in NB-S1 mode can support a maximum of 2 user plane radio bearers (see subclause 6.5.0).

For case c in subclause 5.6.1.1, upon receipt of the CONTROL PLANE SERVICE REQUEST message with Control plane service type indicating "mobile originating request" and without an ESM message container IE, after completion of the EMM common procedures according to subclause 5.6.1.3, if any, the MME proceeds as follows:

If the MME needs to perform an EPS bearer context status synchronization

- for an EPS bearer context associated with Control plane only indication; or

- for an EPS bearer context not associated with Control plane only indication, and there is no downlink user data pending to be delivered via the user plane,

then the MME shall send a SERVICE ACCEPT message.

Furthermore, the MME may:

1) initiate the setup of the user plane radio bearer(s), if downlink user data is pending to be delivered via the user plane;

2) send an ESM DATA TRANSPORT message to the UE, if downlink user data is pending to be delivered via the control plane;

3) send a NAS signalling message not related to an EMM common procedure to the UE, if downlink signalling is pending; or

4) send a SERVICE ACCEPT message to complete the service request procedure, if no NAS security mode control procedure was initiated, the MME did not send a SERVICE ACCEPT message as specified above to perform an EPS bearer context status synchronization, and the MME did not initiate any of the procedures specified in item 1 to 3 above.

If the UE supporting MUSIM does not include the Paging restriction IE in the EXTENDED SERVICE REQUEST message, the MME shall delete any stored paging restriction preferences for the UE and stop restricting paging.

For cases o and p in subclause 5.6.1.1 when the UE supporting MUSIM sets the Request type to "NAS signalling connection release requested" or to "Rejection of paging requested" in the UE request type IE in the EXTENDED SERVICE REQUEST message, the MME shall not establish radio and S1 bearers for any active EPS bearer contexts. If the UE requests restriction of paging by including the Paging restriction IE, the MME shall store the paging restriction preferences of the UE, enforce these restrictions in the paging procedure as described in clause 5.6.2 and send a SERVICE ACCEPT message to complete the service request procedure. The MME shall initiate the release of the NAS signalling connection.

In NB-S1 mode, for cases a, b, c and m in subclause 5.6.1.1, if the MME needs to initiate the setup of user plane radio bearer(s), the MME shall check if the UE can support the establishment of additional user plane radio bearer based on the multiple DRB support indicated by UE in the UE network capability IE.

For cases a, b and c in subclause 5.6.1.1, if the EPS bearer context status IE is included in the CONTROL PLANE SERVICE REQUEST message, the network shall deactivate all those EPS bearer contexts locally (without peer-to-peer signalling between the network and the UE) which are active on the network side but are indicated by the UE as being inactive. If a default EPS bearer context is marked as inactive in the EPS bearer context status IE included in the CONTROL PLANE SERVICE REQUEST message, and this default bearer is not associated with the last PDN connection of the UE in the MME, the MME shall locally deactivate all EPS bearer contexts associated to the PDN connection with the default EPS bearer context without peer-to-peer ESM signalling to the UE. If the default bearer is associated with the last remaining PDN connection of the UE in the MME, and EMM-REGISTERED without PDN connection is supported by the UE and the MME, the MME shall locally deactivate all EPS bearer contexts associated to the PDN connection with the default EPS bearer context without peer-to-peer ESM signalling to the UE.

If the EPS bearer context status IE is included in the CONTROL PLANE SERVICE REQUEST and the MME decides to respond with a SERVICE ACCEPT message, the MME shall include an EPS bearer context status IE, indicating which EPS bearer contexts are active in the MME, except for the case when no EPS bearer context exists on the network side.

If the MME needs to initiate an EPS bearer context status synchronization, the MME may include an EPS bearer context status IE in the SERVICE ACCEPT message also if no EPS bearer context status IE was included in the CONTROL PLANE SERVICE REQUEST message.

If the MME sends a SERVICE ACCEPT message upon receipt of the CONTROL PLANE SERVICE REQUEST message piggybacked with the ESM DATA TRANSPORT message:

- if the Release assistance indication IE is set to "No further uplink and no further downlink data transmission subsequent to the uplink data transmission is expected" in the message;

- if the UE has indicated support for the control plane data back-off timer; and

- if the MME decides to activate the congestion control for transport of user data via the control plane,

then the MME shall include the T3448 value IE in the SERVICE ACCEPT message.

If the MME sends a SERVICE ACCEPT message and decides to deactivate congestion control for transport of user data via the control plane then the MME shall delete the stored control plane data back-off time for the UE and the MME shall not include timer T3448 value IE in SERVICE ACCEPT message.

For cases a, b, c and m in subclause 5.6.1.1, if the EPS bearer context status IE is included in the CONTROL PLANE SERVICE REQUEST message or the MME needs to initiate an EPS bearer context status synchronization, the MME shall consider the service request procedure successfully completed when it sends the SERVICE ACCEPT message. If the EPS bearer context status IE is not included in the CONTROL PLANE SERVICE REQUEST message and the MME does not need to initiate an EPS bearer context status synchronization, the MME shall consider the service request procedure successfully completed in the following cases:

- when it successfully completes a NAS security mode control procedure;

- when it receives an indication from the lower layer that the user plane is setup, if radio bearer establishment is required;

- upon receipt of the CONTROL PLANE SERVICE REQUEST message and completion of the EMM common procedures, if any, if the CONTROL PLANE SERVICE REQUEST message was successfully integrity checked and the ESM message container or NAS message container in the CONTROL PLANE SERVICE REQUEST message, if applicable, was successfully deciphered, radio bearer establishment is not required, and the MME has downlink user data or signalling not related to an EMM common procedure pending; and

- with the transmission of a SERVICE ACCEPT message or with the decision to initiate release of the NAS signalling connection, if the CONTROL PLANE SERVICE REQUEST message was successfully integrity checked and the ESM message container or NAS message container in the CONTROL PLANE SERVICE REQUEST message, if applicable, was successfully deciphered, radio bearer establishment is not required, and the MME does not have any downlink user data or signalling pending.

If the MME considers the service request procedure successfully completed the MME shall:

1) forward the contents of the ESM message container IE, if any, to the ESM layer; and

2) forward the contents of the NAS message container IE, if any.

For cases a, b and c in subclause 5.6.1.1, the UE shall treat the receipt of any of the following as successful completion of the procedure:

- a SECURITY MODE COMMAND message;

- a security protected EMM message different from a SERVICE REJECT message and not related to an EMM common procedure;

- a security protected ESM message; and

- receipt of the indication from the lower layers that the user plane radio bearers are set up.

Upon successful completion of the procedure, the UE shall reset the service request attempt counter, stop the timer T3417 and enter the state EMM-REGISTERED.

NOTE 4: The security protected EMM message can be e.g. a SERVICE ACCEPT message and the ESM message an ESM DATA TRANSPORT message.

For case m in subclause 5.6.1.1, the UE shall treat the indication from the lower layers that the user plane radio bearers are set up as successful completion of the procedure. The UE shall treat the receipt of a SERVICE ACCEPT message as completion of the procedure without the establishment of the user plane radio bearers. For both cases, the UE shall reset the service request attempt counter, stop the timer T3417 and enter the state EMM-REGISTERED.

For case b in subclause 5.6.1.1, the UE shall also treat the indication from the lower layers that the RRC connection has been released as successful completion of the procedure. The UE shall reset the service request attempt counter, stop the timer T3417 and enter the state EMM-REGISTERED.

For cases a, c and m in subclause 5.6.1.1, the UE shall treat the indication from the lower layers that the RRC connection has been released as an abnormal case and shall follow the procedure described in subclause 5.6.1.6, item b.

For cases o and p in subclause 5.6.1.1, when the UE supporting MUSIM in the CONTROL PLANE SERVICE REQUEST message sets the Request type to "NAS signalling connection release requested" or to "Rejection of paging requested" in the UE request type IE, and if the UE,

- requests restriction of paging by including the Paging restriction IE, the UE shall treat the receipt of SERVICE ACCEPT message as the successful completion of the procedure; or

- does not request any restriction of paging by not including the Paging restriction IE, the UE shall treat the indication from the lower layers that the RRC connection has been released as the successful completion of the procedure; and

the UE shall reset the service request attempt counter, stop timer T3417, enter the state EMM-REGISTERED and not deactivate EPS bearer contexts locally.

For cases a, b and c in subclause 5.6.1.1,

- if the MME needs to initiate an EPS bearer context status synchronization, the UE can receive a SERVICE ACCEPT message even after it received a SECURITY MODE COMMAND message or an indication from the lower layers that the user plane radio bearers are set up and determined successful completion of the service request procedure. Upon receipt of the SECURITY MODE COMMAND message or an indication from the lower layers that the user plane radio bearers are set up, the UE shall start timer T3449. If the UE receives a security protected ESM message or a security protected EMM message not related to an EMM common procedure, the UE shall stop the timer T3449. If the UE receives a SERVICE ACCEPT message while the timer T3449 is running, the UE shall treat the SERVICE ACCEPT message and stop the timer T3449. If the UE is not in state EMM-SERVICE-REQUEST-INITIATED and timer T3449 is not running, the receipt of the SERVICE ACCEPT message is considered as protocol error and the UE shall return EMM STATUS message as specified in subclause 7.4; otherwise the UE shall treat the SERVICE ACCEPT message; and

- if the UE treats the SERVICE ACCEPT message and an EPS bearer context status IE is included in the message, the UE shall deactivate all those EPS bearers contexts locally (without peer-to-peer signalling between the UE and the MME) which are active in the UE, but are indicated by the MME as being inactive. If a default EPS bearer context is marked as inactive in the EPS bearer context status IE included in the SERVICE ACCEPT message, and this default bearer is not associated with the last remaining PDN connection in the UE, the UE shall locally deactivate all EPS bearer contexts associated to the PDN connection with the default EPS bearer context without peer-to-peer ESM signalling to the MME. If the default bearer is associated with the last remaining PDN connection of the UE in the MME, and EMM-REGISTERED without PDN connection is supported by the UE and the MME, the UE shall locally deactivate all EPS bearer contexts associated to the PDN connection with the default EPS bearer context without peer-to-peer ESM signalling to the MME.

If the T3448 value IE is present in the received SERVICE ACCEPT message, the UE shall:

- stop timer T3448 if it is running;

- consider the transport of user data via the control plane as successful; and

- start timer T3448 with the value provided in the T3448 value IE.

If the UE is using EPS services with control plane CIoT EPS optimization, the T3448 value IE is present in the SERVICE ACCEPT message and the value indicates that this timer is either zero or deactivated, the UE shall consider this case as an abnormal case and proceed as if the T3448 value IE is not present.

If the UE in EMM-IDLE mode initiated the service request procedure by sending a CONTROL PLANE SERVICE REQUEST message and the SERVICE ACCEPT message does not include the T3448 value IE and if timer T3448 is running, then the UE shall stop timer T3448.

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

### 8.2.15 Extended service request

#### 8.2.15.1 Message definition

This message is sent by the UE to the network

- to initiate a CS fallback or 1xCS fallback call or respond to a mobile terminated CS fallback or 1xCS fallback request from the network; or

- to request the establishment of a NAS signalling connection and of the radio and S1 bearers for packet services, if the UE needs to provide additional information that cannot be provided via a SERVICE REQUEST message.

See table 8.2.15.1.

Message type: EXTENDED SERVICE REQUEST

Significance: dual

Direction: UE to network

Table 8.2.15.1: EXTENDED SERVICE REQUEST message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Protocol discriminator | Protocol discriminator9.2 | M | V | 1/2 |
|  | Security header type | Security header type9.3.1 | M | V | 1/2 |
|  | Extended service request message identity | Message type9.8 | M | V | 1 |
|  | Service type | Service type9.9.3.27 | M | V | 1/2 |
|  | NAS key set identifier | NAS key set identifier9.9.3.21 | M | V | 1/2 |
|  | M-TMSI | Mobile identity9.9.2.3 | M | LV | 6 |
| B- | CSFB response | CSFB response9.9.3.5 | C | TV | 1 |
| 57 | EPS bearer context status | EPS bearer context status9.9.2.1 | O | TLV | 4 |
| D- | Device properties | Device properties9.9.2.0A | O | TV | 1 |
| XY | UE request type | UE request type9.9.3.XX | O | TLV | 3 |
| AB | Paging restriction | Paging restriction9.9.3.YY | O | TLV | 3-5 |

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

#### 8.2.15.X UE request type

The UE shall include this IE if the UE supports MUSIM and requests the release of the NAS signalling connection or requests the network to reject paging.

#### 8.2.15.Y Paging restriction

The UE shall include this IE if the Request type is set to "NAS signalling connection release requested" or to "Rejection of paging requested" in the UE request type IE and the UE requests the network to restrict paging.

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

### 8.2.29 Tracking area update request

#### 8.2.29.1 Message definition

The purposes of sending the tracking area update request by the UE to the network are described in subclause 5.5.3.1. See table 8.2.29.1.

Message type: TRACKING AREA UPDATE REQUEST

Significance: dual

Direction: UE to network

Table 8.2.29.1: TRACKING AREA UPDATE REQUEST message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Protocol discriminator | Protocol discriminator9.2 | M | V | 1/2 |
|  | Security header type | Security header type9.3.1 | M | V | 1/2 |
|  | Tracking area update request message identity | Message type9.8 | M | V | 1 |
|  | EPS update type | EPS update type9.9.3.14 | M | V | 1/2 |
|  | NAS key set identifier | NAS key set identifier9.9.3.21 | M | V | 1/2 |
|  | Old GUTI  | EPS mobile identity9.9.3.12 | M | LV | 12 |
| B- | Non-current native NAS key set identifier | NAS key set identifier9.9.3.21 | O | TV | 1 |
| 8- | GPRS ciphering key sequence number | Ciphering key sequence number 9.9.3.4a | O | TV | 1 |
| 19 | Old P-TMSI signature | P-TMSI signature9.9.3.26 | O | TV | 4 |
| 50 | Additional GUTI | EPS mobile identity9.9.3.12 | O | TLV | 13 |
| 55 | NonceUE | Nonce9.9.3.25 | O | TV | 5 |
| 58 | UE network capability | UE network capability9.9.3.34 | O | TLV | 4-15 |
| 52 | Last visited registered TAI | Tracking area identity9.9.3.32 | O | TV | 6 |
| 5C | DRX parameter | DRX parameter9.9.3.8 | O | TV | 3 |
| A- | UE radio capability information update needed | UE radio capability information update needed9.9.3.35 | O | TV | 1 |
| 57 | EPS bearer context status | EPS bearer context status9.9.2.1 | O | TLV | 4 |
| 31 | MS network capability | MS network capability9.9.3.20 | O | TLV | 4-10 |
| 13 | Old location area identification | Location area identification9.9.2.2 | O | TV | 6 |
| 9- | TMSI status | TMSI status9.9.3.31 | O | TV | 1 |
| 11 | Mobile station classmark 2 | Mobile station classmark 29.9.2.4 | O | TLV | 5 |
| 20 | Mobile station classmark 3 | Mobile station classmark 39.9.2.5 | O | TLV | 2-34 |
| 40 | Supported Codecs | Supported Codec List9.9.2.10 | O | TLV | 5-n |
| F- | Additional update type | Additional update type9.9.3.0B | O | TV | 1 |
| 5D | Voice domain preference and UE's usage setting | Voice domain preference and UE's usage setting9.9.3.44 | O | TLV | 3 |
| E- | Old GUTI type | GUTI type9.9.3.45 | O | TV | 1 |
| D- | Device properties | Device properties9.9.2.0A | O | TV | 1 |
| C- | MS network feature support  | MS network feature support9.9.3.20A | O | TV | 1 |
| 10 | TMSI based NRI container | Network resource identifier container9.9.3.24A | O | TLV | 4 |
| 6A | T3324 value | GPRS timer 29.9.3.16 | O | TLV | 3 |
| 5E | T3412 extended value | GPRS timer 39.9.3.16B | O | TLV | 3 |
| 6E | Extended DRX parameters | Extended DRX parameters9.9.3.46 | O | TLV | 3 |
| 6F | UE additional security capability | UE additional security capability9.9.3.53 | O | TLV | 6 |
| 6D | UE status | UE status9.9.3.54 | O | TLV | 3 |
| 17 | Additional information requested | Additional information requested9.9.3.55 | O | TV | 2 |
| 32 | N1 UE network capability | N1 UE network capability9.9.3.57 | O | TLV | 3-15 |
| 34 | UE radio capability ID availability | UE radio capability ID availability9.9.3.58 | O | TLV | 3 |
| 35 | Requested WUS assistance information | WUS assistance information9.9.3.62 | O | TLV | 3-n |
| 36 | DRX parameter in NB-S1 mode | NB-S1 DRX parameter9.9.3.63 | O | TLV | 3 |
| XY | UE request type | UE request type9.9.3.XX | O | TLV | 3 |
| AB | Paging restriction | Paging restriction9.9.3.YY | O | TLV | 3-5 |

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

#### 8.2.29.X UE request type

The UE shall include this IE if the UE supports MUSIM and requests the release of the NAS signalling connection.

#### 8.2.29.Y Paging restriction

The UE shall include this IE if the Request type is set to "NAS signalling connection release requested" in the UE request type IE and the UE requests the network to restrict paging.

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

### 8.2.33 CONTROL PLANE SERVICE REQUEST

#### 8.2.33.1 Message definition

This message is sent by the UE to the network when the UE is using EPS services with control plane CIoT EPS optimization. See table 8.2.33.1.

Message type: CONTROL PLANE SERVICE REQUEST

Significance: dual

Direction: UE to network

Table 8.2.33.1: CONTROL PLANE SERVICE REQUEST message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Protocol discriminator | Protocol discriminator9.2 | M | V | 1/2 |
|  | Security header type | Security header type9.3.1 | M | V | 1/2 |
|  | Control plane service request message identity | Message type9.8 | M | V | 1 |
|  | Control plane service type | Control plane service type9.9.3.47 | M | V | 1/2 |
|  | NAS key set identifier | NAS key set identifier9.9.3.21 | M | V | 1/2 |
| 78 | ESM message container | ESM message container9.9.3.15 | O | TLV-E | 3-n |
| 67 | NAS message container | NAS message container 9.9.3.22 | O | TLV | 4-253 |
| 57 | EPS bearer context status | EPS bearer context status9.9.2.1 | O | TLV | 4 |
| D- | Device properties | Device properties9.9.2.0A | O | TV | 1 |
| XY | UE request type | UE request type9.9.3.XX | O | TLV | 3 |
| AB | Paging restriction | Paging restriction9.9.3.YY | O | TLV | 3-5 |

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

#### 8.2.33.X UE request type

The UE shall include this IE if the UE supports MUSIM and requests the release of the NAS signalling connection or requests the network to reject paging.

#### 8.2.33.Y Paging restriction

The UE shall include this IE if the Request type is set to "NAS signalling connection release requested" or to "Rejection of paging requested" in the UE request type IE and the UE requests the network to restrict paging.

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

#### 9.9.3.XX UE request type

The purpose of the UE request type information element is to enable a UE supporting MUSIM to request the network to perform specific requests due to activity on another USIM.

The UE request type information element is coded as shown in figure 9.9.3.XX.1 and table 9.9.3.XX.1.

The UE request type is a type 4 information element with a length of 3 octets.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| UE request type IEI | octet 1 |
| Length of UE request type contents | octet 2 |
| 0 Spare | 0 Spare | 0 Spare | 0 Spare | Request type | octet 3 |

Figure 9.9.3.XX.1: UE request type information element

Table 9.9.3.XX.1: UE request type information element

|  |
| --- |
| Request type (bits 4 to 1 of octet 3) |
| Bits |
| 4 | 3 | 2 | 1 |  |
| 0 | 0 | 0 | 0 | reserved |
| 0 | 0 | 0 | 1 | NAS signalling connection release requested |
| 0 | 0 | 1 | 0 | Rejection of paging requested |
|  |
| All other values shall be interpreted as reserved. |
| Bits 5 to 8 of octet 3 are spare and shall be coded as zero. |

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

#### 9.9.3.YY Paging restriction

The purpose of the Paging restriction information element is to request the network to restrict paging.

The Paging restriction information element is coded as shown in figure 9.9.3.YY.1, figure 9.9.3.YY.2 and table 9.9.3.YY.2.

The Paging restriction is a type 4 information element with a minimum length of 3 octets and a maximum length of 5 octets.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Paging restriction IEI | octet 1 |
| Length of Paging restriction contents | octet 2 |
| 0 Spare | 0 Spare | 0 Spare | 0 Spare | Paging restriction type | octet 3 |

Figure 9.9.3.YY.1: Paging restriction information element for Paging restriction type = "All paging is restricted" and for Paging restriction type = "All paging is restricted except voice"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Paging restriction IEI | octet 1 |
| Length of Paging restriction contents | octet 2 |
| 0 Spare | 0 Spare | 0 Spare | 0 Spare | Paging restriction type | octet 3 |
| EBI (7) | EBI (6) | EBI (5) | EBI (4) | EBI (3) | EBI (2) | EBI (1) | EBI(0) | octet 4\* |
| EBI (15) | EBI (14) | EBI (13) | EBI (12) | EBI (11) | EBI (10) | EBI (9) | EBI (8) | octet 5\* |

Figure 9.9.3.YY.2: Paging restriction information element for Paging restriction type = "All paging is restricted except for specified PDN connection(s)", for Paging restriction type = "All paging is restricted except for specified PDU session(s)", for Paging restriction type = "All paging is restricted except for voice service and specified PDN connection(s)", and for Paging restriction type = "All paging is restricted except for voice service and specified PDU session(s)"

Table 9.9.3.YY.1: Paging restriction information element

|  |
| --- |
| Paging restriction type (bits 4 to 1 of octet 3) |
| Bits |
| 4 | 3 | 2 | 1 |  |
| 0 | 0 | 0 | 0 | reserved |
| 0 | 0 | 0 | 1 | All paging is restricted |
| 0 | 0 | 1 | 0 | All paging is restricted except for voice service |
| 0 | 0 | 1 | 1 | All paging is restricted except for specified PDN connection(s) in EPSAll paging is restricted except for specified PDU session(s) in 5GS |
| 0 | 1 | 0 | 0 | All paging is restricted except for voice service and specified PDN connection(s) in EPSAll paging is restricted except for voice service and specified PDU session(s) in 5GS |
|  |
| All other values shall be interpreted as reserved. |
| Bits 5 to 8 of octet 3 are spare and shall be coded as zero.EBI(x) (bits 8 to 1 of octet 4 and octet 5):In EPS, this field indicates the PDN connections associated with the EPS bearer identities for which paging is restricted. In 5GS, this field indicates the PDU session identity of the PDU session for which paging is restricted. This field is encoded as follows.EBI(0): (bit 1 of octet 4)Spare and shall be coded as zero.EBI(1) – EBI(15):0 In EPS, this indicates that paging is restricted for the PDN connection associated with the EPS bearer identity. In 5GS, this indicates that paging is restricted for the PDU session associated with the PDU session identity.1 In EPS, this indicates that paging is not restricted for the PDN connection associated with the EPS bearer identity. In 5GS, this indicates that paging is not restricted for the PDU session associated with the PDU session identity. |
|  |