**E3GPP TSG-CT WG1 Meeting #133-eC1-216593-rev01**

**E-meeting, 11-19 November 2021 rev of C1-216593**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **24.301** | **CR** | **3620** | **rev** | **1** | **Current version:** | **17.4.1** |  |
|  | | | | | | | | |
| *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:*** | Handling of reject cause #78 in EMM procedures | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | OPPO, Huawei, HiSilicion, MediaTek Inc. | | | | | | | | | |
| ***Source to TSG:*** | C1 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | IoT\_SAT\_ARCH\_EPS | | | | |  | ***Date:*** | | | 2021-11-12 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-17 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) ... Rel-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | As part of the IoT\_SAT\_ARCH\_EPS work, SA2 has agreed S2-2108025 which amongst other things, introduce into 23.401 (i.e EPS) that the NW (MME) can reject the UE accesing through satellite E-UTRAN, if the NW considers that the UE is in a location that the NW cannot provide service / operate.  This part of the agreed stage 2 requirement has to be reflected into stage 3 , TS 24.301. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Introduce to the EMM procedures, the NW can, if it determines that the UE is in a location that the NW cannot provide service, reject the UE with the reject cause #78 "PLMN not allowed to operate at the present UE location". | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Stage 2 requirements will not be reflected in stage 3. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 3.1, 5.5.1.2.5, 5.5.1.2.6, 5.5.2.3.1, 5.5.2.3.2, 5.5.3.2.5, 5.5.3.2.6, 5.6.1.5, 5.6.1.6 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **X** |  | Other core specifications | | | | TS/TR 23.401 CR 3663 | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
| ***E*** | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

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

## 3.1 Definitions

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

The term "mobile station" (MS) in the present document is synonymous with the term "user equipment" (UE) as defined in 3GPP TR 21.905 [1].

**1x CS fallback capable UE:** A UE that uses a CS infrastructure for a voice call and other CS-domain services by falling back to cdma2000® 1x access network if the UE is served by E‑UTRAN when a CS service is requested.

**Aggregate maximum bit rate:** The maximum bit rate that limits the aggregate bit rate of a set of non-GBR bearers of a UE. Definition derived from 3GPP TS 23.401 [10].

**APN based congestion control:** Congestion control in session management where the network can reject session management requests from UEs or deactivate PDN connections when the associated APN is congested.

**Attached for emergency bearer services:** A UE is attached for emergency bearer services if it has only a PDN connection for emergency bearer services established.

**Attached for access to RLOS:** A UE is attached for access to RLOS if the UE requested access to RLOS during the attach procedure and has a PDN connection for RLOS established after completion of attach procedure.

**Chosen PLMN:** The same as selected PLMN as specified in 3GPP TS 23.122 [6].

**Control plane CIoT EPS optimization:** signalling optimizations to enable efficient transport of user data (IP, non-IP, Ethernet or SMS) over control plane via the MME including optional header compression of IP data.

**User plane CIoT EPS optimization:** signalling optimizations to enable efficient transport of user data (IP, non-IP or Ethernet) over the user plane.

**UE supporting CIoT EPS optimizations:** A UE that supports control plane CIoT EPS optimization or user plane CIoT EPS optimization and one or more other CIoT EPS optimizations when the UE is in S1 mode.

**Attached for EPS services with CP-CIoT EPS optimization:** A UE supporting CIoT EPS optimizations is attached for EPS services, and control plane CIoT EPS optimization along with one or more other CIoT EPS optimizations have been accepted by the network.

**Attached for EPS services with User plane CIoT EPS optimization:** A UE supporting CIoT EPS optimizations is attached for EPS services, and user plane CIoT EPS optimization along with one or more other CIoT EPS optimizations have been accepted by the network.

**Attached for EPS services with CIoT EPS optimization:** A UE is attached for EPS services with CP-CIoT EPS optimization or attached for EPS services with user plane CIoT EPS optimization.

**CS fallback cancellation request:** A request received from the MM sublayer to cancel a mobile originating CS fallback.

**CS fallback capable UE:** A UE that uses a CS infrastructure for a voice call and other CS-domain services by falling back to A/Gb or Iu mode if the UE is served by E‑UTRAN when a CS service is requested.

**CSG cell:** A cell in which only members of the CSG can get normal service. Depending on local regulation, the CSG cell can provide emergency bearer services also to subscribers who are not member of the CSG. Definition derived from 3GPP TS 23.401 [10].

**CSG ID:** A CSG ID is a unique identifier within the scope of one PLMN defined in 3GPP TS 23.003 [2] which identifies a Closed Subscriber Group (CSG) in the PLMN associated with a cell or group of cells to which access is restricted to members of the CSG.

**CSG selection**: A UE supporting CSG selection selects CSG cell either automatically based on the list of allowed CSG identities or manually based on user selection of CSG on indication of list of available CSGs. Definition derived from 3GPP TS 23.122 [6].

**Dedicated bearer:** An EPS bearer that is associated with uplink packet filters in the UE and downlink packet filters in the PDN GW where the filters only match certain packets. Definition derived from 3GPP TS 23.401 [10].

**Default bearer:** An EPS bearer that gets established with every new PDN connection. Its context remains established throughout the lifetime of that PDN connection. A default EPS bearer is a non-GBR bearer. Definition derived from 3GPP TS 23.401 [10].

**Emergency EPS bearer context:** A default EPS bearer context activated with request type "emergency" or "handover of emergency bearer services", or any dedicated EPS bearer context associated to this default EPS bearer context.

**EMM context:** An EMM context is established in the UE and the MME when an attach procedure is successfully completed.

**EMM-CONNECTED mode:** A UE is in EMM-CONNECTED mode when a NAS signalling connection between UE and network is established. The term EMM-CONNECTED mode used in the present document corresponds to the term ECM-CONNECTED state used in 3GPP TS 23.401 [10].

**EMM-IDLE mode:** A UE is in EMM-IDLE mode when no NAS signalling connection between UE and network exists or when RRC connection suspend has been indicated by lower layers. The term EMM-IDLE mode used in the present document corresponds to the term ECM-IDLE state used in 3GPP TS 23.401 [10].

**EPS security context:** In the present specification, EPS security context is used as a synonym for EPS NAS security context specified in 3GPP TS 33.401 [19].

**EPS services:** Services provided by PS domain. Within the context of this specification, EPS services is used as a synonym for GPRS services in 3GPP TS 24.008 [13].

**Evolved packet core network:** The successor to the 3GPP Release 7 packet-switched core network, developed by 3GPP within the framework of the 3GPP System Architecture Evolution (SAE).

**Evolved packet system:** The evolved packet system (EPS) or evolved 3GPP packet-switched domain consists of the evolved packet core network and the evolved universal terrestrial radio access network. Definition derived from 3GPP TS 23.401 [10].

**GBR bearer:** An EPS bearer that uses dedicated network resources related to a guaranteed bit rate (GBR) value, which are permanently allocated at EPS bearer establishment/modification. Definition derived from 3GPP TS 23.401 [10].

**General NAS level mobility management congestion control:** The type of congestion control that is applied at a general overload or congestion situation in the network, e.g. lack of processing resources.

**Group specific session management congestion control:** Type of congestion control at session management level that is applied to reject session management requests from UEs belonging to a particular group when one or more group congestion criteria as specified in 3GPP TS 23.401 [10] are met.

**Highest ranked ACDC category: The** ACDC category with the lowest value as defined in 3GPP TS 24.105 [35].

**Initial NAS message:** A NAS message is considered as an initial NAS message, if this NAS message can trigger the establishment of a NAS signalling connection. For instance, the ATTACH REQUEST message is an initial NAS message.

**IPv4v6 capability:** Capability of the IP stack associated with a UE to support a dual stack configuration with both an IPv4 address and an IPv6 address allocated.

**Kilobit:** 1000 bits.

**Last Visited Registered TAI:** A TAI which is contained in the TAI list that the UE registered to the network and which identifies the tracking area last visited by the UE.

**Linked Bearer Identity:** This identity indicates to which default bearer the additional bearer resource is linked.

**LIPA PDN connection:** A PDN connection, for which the default EPS bearer context or default PDP context was activated with an APN authorized to use LIPA. The network authorizes an APN for using LIPA based on the subscription profile (see 3GPP TS 29.272 [16C]) and subsequently the network considers this PDN connection a LIPA PDN connection.

**Lower layer failure**: A failure reported by the AS to the NAS that cannot be corrected on AS level. When the AS indicates a lower layer failure to NAS, the NAS signalling connection is not available.

**Mapped EPS security context:** A mapped security context to be used in EPS. Definition derived from 3GPP TS 33.401 [19].

**Mapped GUTI:** A GUTI which is mapped from a P-TMSI and an RAI allocated previously by an SGSN. Mapping rules are defined in 3GPP TS 23.003 [2]. Definition derived from 3GPP TS 23.401 [10].

**Megabit:** 1,000,000 bits.

**Message header:** A standard L3 message header as defined in 3GPP TS 24.007 [12].

**MME area:** An area containing tracking areas served by an MME.

**MO MMTEL voice call is started**: the MO-MMTEL-voice-started indication was received from upper layers (see 3GPP TS 24.173 [13E]) and after reception of the MO-MMTEL-voice-started indication, the MO-MMTEL-voice-ended indication has not been received.

**MO MMTEL video call is started**: the MO-MMTEL-video-started indication was received from upper layers (see 3GPP TS 24.173 [13E]) and after reception of the MO-MMTEL-video-started indication, the MO-MMTEL-video-ended indication has not been received.

**MO SMSoIP is started**: the MO-SMSoIP-attempt-started indication was received from upper layers (see 3GPP TS 24.341 [15D]) and after reception of the MO-SMSoIP-attempt-started indication, the MO-SMSoIP-attempt-ended indication has not been received.

**NAS level mobility management congestion control:** Congestion control mechanism in the network in mobility management. "NAS level mobility management congestion control" consists of "subscribed APN based congestion control" and "general NAS level mobility management congestion control".

**NAS signalling connection:** A peer to peer S1 mode connection between UE and MME. A NAS signalling connection consists of the concatenation of an RRC connection via the "LTE-Uu" interface and an S1AP connection via the S1 interface. Additionally, for the purpose of optimized handover or idle mode mobility from cdma2000® HRPD access to E‑UTRAN (see 3GPP TS 23.402 [11]), the NAS signalling connection can consist of a concatenation of an S101‑AP connection and a signalling tunnel over a cdma2000® HRPD access network.

NOTE 1: cdma2000® is a registered trademark of the Telecommunications Industry Association (TIA-USA).

**NAS signalling connection recovery**: A mechanism initiated by the NAS to restore the NAS signalling connection on indication of "RRC connection failure" by the lower layers.

**Native GUTI:** A GUTI previously allocated by an MME. Definition derived from 3GPP TS 23.401 [10].

**Non-access stratum protocols:** The protocols between UE and MSC or SGSN that are not terminated in the UTRAN, and the protocols between UE and MME that are not terminated in the E-UTRAN. Definition derived from 3GPP TR 21.905 [1].

**Non-emergency EPS bearer context:** Any EPS bearer context which is not an emergency EPS bearer context.

**Non-EPS services:** Services provided by CS domain. Within the context of this specification, non-EPS services is used as a synonym for non-GPRS services in 3GPP TS 24.008 [13]. A UE which camps on E-UTRAN can attach to both EPS services and non-EPS services.

**Non-GBR bearer:** An EPS bearer that uses network resources that are not related to a guaranteed bit rate (GBR) value. Definition derived from 3GPP TS 23.401 [10].

**PDN address:** An IP address assigned to the UE by the Packet Data Network Gateway (PDN GW).

**PDN connection for emergency bearer services:** A PDN connection with an emergency EPS bearer context or with a default PDP context activated with request type "emergency" or "handover of emergency bearer services".

**PDN connection for RLOS:** A PDN connection for which the default EPS bearer context was activated with request type "RLOS".

**Plain NAS message:** A NAS message with a header including neither a message authentication code nor a sequence number.

**Persistent EPS bearer context:** either a non-emergency EPS bearer context representing a GBR bearer with QoS equivalent to QoS of teleservice 11 and where there is a radio bearer associated with that context, or an emergency EPS bearer context where there is a radio bearer associated with that context.

NOTE 2: An example of a persistent EPS bearer context is a non-emergency EPS bearer context with QCI = 1 where there is a radio bearer associated with that context.

**Procedure Transaction Identity:** An identity which is dynamically allocated by the UE for the UE requested ESM procedures. The procedure transaction identity is released when the procedure is completed.

**RAT-related TMSI:** When the UE is camping on an E-UTRAN cell, the RAT-related TMSI is the GUTI; when it is camping on a GERAN or UTRAN cell, the RAT-related TMSI is the P-TMSI.

**Registered PLMN**: The PLMN on which the UE is registered. The identity of the registered PLMN is provided to the UE within the GUTI.

**Relay node:** A network element in the E-UTRAN, wirelessly connected to an eNode B and providing relaying function to UEs served by the E-UTRAN. Definition derived from 3GPP TS 23.401 [10].

**Removal of eCall only mode restriction:** All the limitations as described in 3GPP TS 22.101 [46] for the eCall only mode do not apply any more.

**RLOS EPS bearer context:** A default RLOS EPS bearer context which was activated with request type "RLOS", or any dedicated EPS bearer context associated to this default EPS bearer context.

The label **(S1 mode only)** indicates that this clause or paragraph applies only to a system which operates in S1 mode, i.e. with a functional division that is in accordance with the use of an S1 interface between the radio access network and the core network. The S1 mode includes WB-S1 mode and NB-S1 mode. In a multi-access system this case is determined by the current serving radio access network.

**In NB-S1 mode:** Indicates this paragraph applies only to a system which operates in NB-S1 mode. For a multi-access system this case applies if the current serving radio access network provides access to network services via E-UTRA by NB-IoT (see 3GPP TS 36.300 [20], 3GPP TS 36.331 [22], 3GPP TS 36.306 [44]).

**In WB-S1 mode:** Indicates this paragraph applies only to a system which operates in WB-S1 mode. For a multi-access system this case applies if the system operates in S1 mode, but not in NB-S1 mode.

**In WB-S1/CE mode:** Indicates this paragraph applies only when a UE, which is a CE mode B capable UE (see 3GPP TS 36.306 [44]), is operating in CE mode A or B in WB-S1 mode.

**SCEF PDN Connection:** A PDN connection established between the UE and the Service Capability Exposure Function (SCEF) for transmitting the UE's non-IP data related to a specific application.

**SGi PDN Connection:** A PDN connection established between the UE and the Packet Gateway (P-GW) for transmitting the UE's IP, non-IP or Ethernet data related to a specific application.

**S101 mode:** Applies to a system that operates with a functional division that is in accordance with the use of an S101 interface. For the definition of the S101 reference point, see 3GPP TS 23.402 [11].

**SIPTO at the local network PDN connection:** A PDN connection, for which the default EPS bearer context or default PDP context was activated with an APN authorized to use SIPTO at the local network and it was activated such that the traffic of the PDN connection will be using an L-GW. The network authorizes an APN for using SIPTO at the local network based on the subscription profile (see 3GPP TS 29.272 [16C]) and subsequently the network considers this PDN connection a SIPTO at the local network PDN connection. SIPTO at the local network PDN connection can be of IP, non-IP or Ethernet PDN type.

**SIPTO at the local network PDN connection with a collocated L-GW:** A SIPTO at the local network PDN connection which is established to a L-GW function collocated with the (H)(e)NodeB. The core-network entity (i.e. the MME or the SGSN) can be aware of whether the SIPTO at the local network PDN connection with a collocated L-GW is used when the PDN connection is established.

**SIPTO at the local network PDN connection with a stand-alone GW:** A SIPTO at the local network PDN connection which is established to a stand-alone GW (with collocated L-GW and S-GW). The core-network entity (i.e. the MME or the SGSN) can be aware of whether the SIPTO at the local network PDN connection with a stand-alone GW is used when the PDN connection is established.

**"SMS only":** A subset of services which includes only Short Message Service. A UE camping on E-UTRAN can attach to both EPS services and "SMS only".

**SMS over NAS**: refers to SMS in MME or SMS over SGs.

**SMS over S102**: refers to SMS which uses 1xCS procedures in EPS as defined in 3GPP TS 23.272 [9].

**Subscribed APN based congestion control:** Congestion control in mobility management where the network can reject attach requests from UEs with a certain APN in the subscription.

**TAI list:** A list of TAIs that identify the tracking areas that the UE can enter without performing a tracking area updating procedure. The TAIs in a TAI list assigned by an MME to a UE pertain to the same MME area.

**Traffic flow aggregate:** A temporary aggregate of packet filters that are included in a UE requested bearer resource allocation procedure or a UE requested bearer resource modification procedure and that is inserted into a traffic flow template (TFT) for an EPS bearer context by the network once the UE requested bearer resource allocation procedure or UE requested bearer resource modification procedure is completed.

**UE configured for dual priority:** A UE which provides dual priority support is configured for NAS signalling low priority and also configured to override the NAS signalling low priority indicator (see 3GPP TS 24.368 [15A], 3GPP TS 31.102 [17]).

**UE configured to use AC11 – 15 in selected PLMN:** A UE configured with at least one access class in the range 11-15 on the USIM, and the access class is applicable in the selected PLMN according to 3GPP TS 22.011 [1A].

**UE's availability for voice calls in the IMS:** The indication of this availability or non-availability is provided by the upper layers of the UE as specified in 3GPP TS 24.229 [13D] in the annex relevant to the IP-Connectivity Access Network in use or determined in the NAS layer, as specified in clause 4.3.1. If availability is indicated, the UE uses the IM CN Subsystem and can terminate or originate requests for SIP sessions including an audio component with codecs suited for voice.

**UE's usage setting:** This is a UE setting that indicates whether the UE has preference for voice services over data services or vice-versa. If a UE has preference for voice services, then the UE's usage setting is "voice centric". If a UE has preference for data services, then the UE's usage setting is "data centric". A UE whose setting is "data centric" may still require access to voice services. A UE whose setting is "voice centric" may still require access to data services. This definition is derived from 3GPP TS 23.221 [8A] and it applies to voice capable UEs. If the UE is capable of both S1 mode and N1 mode, there is a single UE's usage setting which applies to both 5GS and EPS (see 3GPP TS 24.501 [54]).

**UE using EPS services with control plane CIoT EPS optimization:** AUE that is attached for EPS services with the control plane CIOT EPS optimization accepted by the network.

For the purposes of the present document, the following terms and definitions given in 3GPP TS 23.221 [8A] apply:

**Restricted local operator services**

For the purposes of the present document, the following terms and definitions given in 3GPP TS 23.401 [10] apply:

**APN rate control status**

**Cellular IoT (CIoT)**

**DCN-ID**

**eCall only mode**

**NarrowBand-IoT**

**Dedicated core network**

**PDN connection**

**Service Gap Control**

**UE paging probability information**

For the purposes of the present document, the following terms and definitions given in 3GPP TS 23.272 [9] apply:

**CS fallback**

**SMS in MME**

**SMS over SGs**

For the purposes of the present document, the following terms and definitions given in 3GPP TS 23.682 [11A] apply:

**SCEF**

For the purposes of the present document, the following terms and definitions given in 3GPP TS 24.008 [13] apply:

**A/Gb mode**

**Access domain selection**

**Default PDP context**

**Extended idle-mode DRX cycle**

**Iu mode**

**Power saving mode**

**PS signalling connection**

**RR connection**

**TFT**

For the purposes of the present document, the following terms and definitions given in 3GPP TS 33.102 [18] apply:

**UMTS security context**

For the purposes of the present document, the following terms and definitions given in 3GPP TS 33.401 [19] apply:

**Current EPS security context**

**Full native EPS security context**

**KASME**

**K'ASME**

**Mapped security context**

**Native EPS security context**

**Non-current EPS security context**

**Partial native EPS security context**

**Data via MME**

For the purposes of the present document, the following terms and definitions given in 3GPP TS 23.122 [6] apply:

**Country**

**EHPLMN**

**HPLMN**

**Shared Network**

**Suitable Cell**

**VPLMN**

**Limited Service State**

For the purposes of the present document, the following terms and definitions given in 3GPP TS 23.216 [8] apply:

**SRVCC**

**vSRVCC**

For the purposes of the present document, the following terms and definitions given in 3GPP TS 22.011 [1A] apply:

**Extended Access Barring**

**Application specific Congestion control for Data Communication (ACDC)**

For the purposes of the present document, the following terms and definitions given in 3GPP TS 23.003 [10] apply:

**Local Home Network Identifier**

For the purposes of the present document, the following terms and definitions given in 3GPP TS 23.303 [31] apply:

**ProSe direct communication**

**ProSe direct discovery**

**ProSe UE-to-Network Relay**

For the purposes of the present document, the following terms and definitions given in 3GPP TS 24.161 [36] apply:

**Multi-access PDN connection**

**NBIFOM**

For the purposes of the present document, the following terms and definitions given in 3GPP TS 23.167 [45] apply:

**eCall over IMS**

For the purposes of the present document, the following terms and definitions given in 3GPP TS 24.501 [54] apply:

**5G-EA**

**5G-IA**

**5GMM-CONNECTED mode**

**5GMM-DEREGISTERED**

**5GMM-DEREGISTERED-INITIATED**

**5GMM-IDLE mode**

**5GMM-NULL**

**5GMM-****REGISTERED**

**5GMM-REGISTERED-INITIATED**

**5GMM-SERVICE-REQUEST-INITIATED**

**Applicable UE radio capability ID for the current UE radio configuration in the selected network**

**Control plane CIoT 5GS optimization**

**N1 mode**

**NB-N1 mode**

**UE operating in single-registration mode in a network supporting N26 interface**

**User plane CIoT 5GS optimization**

For the purposes of the present document, the following terms and definitions given in 3GPP TS 36.413 [23] apply:

**User Location Information**

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

##### 5.5.1.2.5 Attach not accepted by the network

If the attach request cannot be accepted by the network, the MME shall send an ATTACH REJECT message to the UE including an appropriate EMM cause value.

If EMM-REGISTERED without PDN connection is not supported by the UE or the MME, the attach request included a PDN CONNECTIVITY REQUEST message, the attach procedure fails due to:

- a default EPS bearer setup failure;

- an ESM procedure failure; or

- operator determined barring is applied on default EPS bearer context activation during attach procedure,

the MME shall:

- combine the ATTACH REJECT message with a PDN CONNECTIVITY REJECT message contained in the ESM message container information element. In this case the EMM cause value in the ATTACH REJECT message shall be set to #19 "ESM failure"; or

- send the ATTACH REJECT message with the EMM cause set to #15 "No suitable cells in tracking area", if the PDN connectivity reject is due to ESM cause #29 subject to operator policies (see 3GPP TS 29.274 [16D] for further details). In this case, the network may additionally include the Extended EMM cause IE with value "E-UTRAN not allowed".

If the attach request is rejected due to NAS level mobility management congestion control, the network shall set the EMM cause value to #22 "congestion" and assign a value for back-off timer T3346.

In NB-S1 mode, if the attach request is rejected due to operator determined barring (see 3GPP TS 29.272 [16C]), the network shall set the EMM cause value to #22 "congestion" and assign a value for back-off timer T3346.

If the attach request is rejected due to service gap control as specified in clause 5.3.17 i.e. the T3447 timer is running, the network shall set the EMM cause value to #22 "congestion" and may assign a back-off timer T3346 with the remaining time of the running T3447 timer.

If the attach request is rejected due to incompatibility between the CIoT EPS optimizations supported by the UE and what the network supports and the network sets the EMM cause value to #15 "no suitable cells in tracking area", the network may additionally include the Extended EMM cause IE with value "requested EPS optimization not supported".

NOTE 1: How the UE uses the Extended EMM cause IE with value "requested EPS optimization not supported" is implementation specific. The UE still behaves according to the EMM cause value #15.

Based on operator policy, if the attach request is rejected due to core network redirection for CIoT optimizations, the network shall set the EMM cause value to #31 "Redirection to 5GCN required".

NOTE 2: The network can take into account the UE's N1 mode capability, the 5GS CIoT network behaviour supported by the UE or the 5GS CIoT network behaviour supported by the 5GCN to determine the rejection with the EMM cause value #31 "Redirection to 5GCN required".

If the attach request is from a UE via a satellite E-UTRA cell and the network using the User Location Information provided by the eNodeB (see 3GPP TS 36.413 [23]), is able to determine that the UE is in a location where the network is not allowed to operate, the network shall set the EMM cause value in the ATTACH REJECT message to #78 "PLMN not allowed to operate at the present UE location" and may include an information element in the ATTACH REJECT message to indicate the country of the UE location.

Editor's note: [IoT\_SAT\_ARCH\_EPS, CR#3620]: The name and the encoding of the information element providing the country of the UE location is FFS.

Editor's note [IoT\_SAT\_ARCH\_EPS, CR#3620]: It is FFS if and how the HPLMN can influence the validity and use of the indication of country of UE location in the UE.

Upon receiving the ATTACH REJECT message, if the message is integrity protected or contains a reject cause other than EMM cause value #25, the UE shall stop timer T3410.

If the ATTACH REJECT message with EMM cause #25 was received without integrity protection, then the UE shall discard the message.

The UE shall take the following actions depending on the EMM cause value received in the ATTACH REJECT message.

#3 (Illegal UE);

#6 (Illegal ME); or

#8 (EPS services and non-EPS services not allowed);

The UE shall set the EPS update status to EU3 ROAMING NOT ALLOWED (and shall store it according to clause 5.1.3.3) and shall delete any GUTI, last visited registered TAI, TAI list and eKSI. The UE shall consider the USIM as invalid for EPS services and non-EPS services until switching off or the UICC containing the USIM is removed or the timer T3245 expires as described in clause 5.3.7a. Additionally, the UE shall delete the list of equivalent PLMNs and enter state EMM-DEREGISTERED.NO-IMSI. If the message has been successfully integrity checked by the NAS and the UE maintains a counter for "SIM/USIM considered invalid for GPRS services", then the UE shall set this counter to UE implementation-specific maximum value. If the message has been successfully integrity checked by the NAS and the UE maintains a counter for "SIM/USIM considered invalid for non-GPRS services", then the UE shall set this counter to UE implementation-specific maximum value.

If A/Gb mode or Iu mode is supported by the UE, the UE shall in addition handle the MM parameters update status, TMSI, LAI and ciphering key sequence number, and the GMM parameters GMM state, GPRS update status, P-TMSI, P-TMSI signature, RAI and GPRS ciphering key sequence number as specified in 3GPP TS 24.008 [13] for the case when the normal attach procedure is rejected with the GMM cause with the same value.

For the EMM cause value #3 or #6, if the UE is operating in single-registration mode, the UE shall in addition handle the 5GMM parameters 5GMM state, 5GS update status, 5G-GUTI, last visited registered TAI, TAI list and ngKSI as specified in 3GPP TS 24.501 [54] for the case when the initial registration procedure performed over 3GPP access is rejected with the 5GMM cause with the same value.

For the EMM cause value #8, if the UE is operating in single-registration mode, the UE shall in addition set the 5GMM state to 5GMM-DEREGISTERED, 5GS update status to 5U3 ROAMING NOT ALLOWED, and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI.

NOTE 3: The possibility to configure a UE so that the radio transceiver for a specific RAT is not active, although it is implemented in the UE, is out of scope of the present specification.

#7 (EPS services not allowed);

The UE shall set the EPS update status to EU3 ROAMING NOT ALLOWED (and shall store it according to clause 5.1.3.3) and shall delete any GUTI, last visited registered TAI, TAI list and eKSI. The UE shall consider the USIM as invalid for EPS services until switching off or the UICC containing the USIM is removed or the timer T3245 expires as described in clause 5.3.7a. Additionally, the UE shall enter state EMM-DEREGISTERED. If the message has been successfully integrity checked by the NAS and the UE maintains a counter for "SIM/USIM considered invalid for GPRS services", then the UE shall set this counter to UE implementation-specific maximum value.

If A/Gb mode or Iu mode is supported by the UE, the UE shall in addition handle the GMM parameters GMM state, GPRS update status, P-TMSI, P-TMSI signature, RAI and GPRS ciphering key sequence number as specified in 3GPP TS 24.008 [13] for the case when the normal attach procedure is rejected with the GMM cause with the same value.

If the UE is operating in single-registration mode, the UE shall in addition handle the 5GMM parameters 5GMM state, 5GS update status, 5G-GUTI, last visited registered TAI, TAI list and ngKSI as specified in 3GPP TS 24.501 [54] for the case when the initial registration procedure performed over 3GPP access is rejected with the 5GMM cause with the same value.

#11 (PLMN not allowed); or

#35 (Requested service option not authorized in this PLMN);

The UE shall set the EPS update status to EU3 ROAMING NOT ALLOWED (and shall store it according to clause 5.1.3.3) and shall delete any GUTI, last visited registered TAI, TAI list and eKSI. Additionally, the UE shall delete the list of equivalent PLMNs and reset the attach attempt counter.

In S1 mode, the UE shall store the PLMN identity in the "forbidden PLMN list" and enter state EMM-DEREGISTERED.PLMN-SEARCH and if the UE is configured to use timer T3245 (see 3GPP TS 24.368 [15] or 3GPP TS 31.102 [17]) then the UE shall start timer T3245 and proceed as described in clause 5.3.7a. The UE shall perform a PLMN selection according to 3GPP TS 23.122 [6]. If the message has been successfully integrity checked by the NAS and the UE maintains a PLMN-specific attempt counter for that PLMN, then the UE shall set this counter to the UE implementation-specific maximum value.

In S101 mode, the UE shall store the PLMN identity provided with the indication from the lower layers to prepare for an S101 mode to S1 mode handover in the list of "forbidden PLMNs for attach in S101 mode" and enter the state EMM-DEREGISTERED.NO-CELL-AVAILABLE and if the UE is configured to use timer T3245 (see 3GPP TS 24.368 [15A] or 3GPP TS 31.102 [17]) then the UE shall start timer T3245 and proceed as described in clause 5.3.7a.

If A/Gb mode or Iu mode is supported by the UE, the UE shall in addition handle the MM parameters update status, TMSI, LAI, ciphering key sequence number and location update attempt counter, and the GMM parameters GMM state, GPRS update status, P-TMSI, P-TMSI signature, RAI, GPRS ciphering key sequence number and GPRS attach attempt counter as specified in 3GPP TS 24.008 [13] for the case when the normal attach procedure is rejected with the GMM cause value #11and no RR connection exists.

For the EMM cause value #11, if the UE is operating in single-registration mode, the UE shall in addition handle the 5GMM parameters 5GMM state, 5GS update status, 5G-GUTI, last visited registered TAI, TAI list, ngKSI and registration attempt counter as specified in 3GPP TS 24.501 [54] for the case when the initial registration procedure performed over 3GPP access is rejected with the 5GMM cause with the same value.

For the EMM cause value #35, if the UE is operating in single-registration mode, the UE shall in addition set the 5GMM state to 5GMM-DEREGISTERED, 5GS update status to 5U3 ROAMING NOT ALLOWED, and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI. Additionally, the UE shall reset the registration attempt counter.

#12 (Tracking area not allowed);

The UE shall set the EPS update status to EU3 ROAMING NOT ALLOWED (and shall store it according to clause 5.1.3.3) and shall delete any GUTI, last visited registered TAI, TAI list and eKSI. Additionally, the UE shall reset the attach attempt counter.

In S1 mode, the UE shall store the current TAI in the list of "forbidden tracking areas for regional provision of service" and enter the state EMM-DEREGISTERED.LIMITED-SERVICE. If the ATTACH REJECT message is not integrity protected, the UE shall memorize the current TAI was stored in the list of "forbidden tracking areas for regional provision of service" for non-integrity protected NAS reject message.

In S101 mode, the UE shall store the PLMN identity provided with the indication from the lower layers to prepare for an S101 mode to S1 mode handover in the list of "forbidden PLMNs for attach in S101 mode" and enter the state EMM-DEREGISTERED.NO-CELL-AVAILABLE and if the UE is configured to use timer T3245 (see 3GPP TS 24.368 [15A] or 3GPP TS 31.102 [17]) then the UE shall start timer T3245 and proceed as described in clause 5.3.7a.

If A/Gb mode or Iu mode is supported by the UE, the UE shall in addition handle the GMM parameters GMM state, GPRS update status, P-TMSI, P-TMSI signature, RAI, GPRS ciphering key sequence number and GPRS attach attempt counter as specified in 3GPP TS 24.008 [13] for the case when the normal attach procedure is rejected with the GMM cause with the same value.

If the UE is operating in single-registration mode, the UE shall in addition handle the 5GMM parameters 5GMM state, 5GS update status, 5G-GUTI, last visited registered TAI, TAI list, ngKSI and registration attempt counter as specified in 3GPP TS 24.501 [54] for the case when the initial registration procedure performed over 3GPP access is rejected with the 5GMM cause with the same value.

#13 (Roaming not allowed in this tracking area);

The UE shall set the EPS update status to EU3 ROAMING NOT ALLOWED (and shall store it according to clause 5.1.3.3) and shall delete any GUTI, last visited registered TAI, TAI list and eKSI. The UE shall delete the list of equivalent PLMNs and reset the attach attempt counter.

In S1 mode, the UE shall store the current TAI in the list of "forbidden tracking areas for roaming". If the ATTACH REJECT message is not integrity protected, the UE shall memorize the current TAI was stored in the list of "forbidden tracking areas for roaming" for non-integrity protected NAS reject message. Additionally, the UE shall enter the state EMM-DEREGISTERED.LIMITED-SERVICE or optionally EMM-DEREGISTERED.PLMN-SEARCH. If the UE is registered in N1 mode and operating in dual-registration mode, the PLMN that the UE chooses to register in is specified in 3GPP TS 24.501 [54] clause 4.8.3. Otherwise the UE shall perform a PLMN selection according to 3GPP TS 23.122 [6].

In S101 mode, the UE shall store the PLMN identity provided with the indication from the lower layers to prepare for an S101 mode to S1 mode handover in the list of "forbidden PLMNs for attach in S101 mode" and enter the state EMM-DEREGISTERED.NO-CELL-AVAILABLE and if the UE is configured to use timer T3245 (see 3GPP TS 24.368 [15A] or 3GPP TS 31.102 [17]) then the UE shall start timer T3245 and proceed as described in clause 5.3.7a.

If A/Gb mode or Iu mode is supported by the UE, the UE shall in addition handle the GMM parameters GMM state, GPRS update status, P-TMSI, P-TMSI signature, RAI, GPRS ciphering key sequence number and GPRS attach attempt counter as specified in 3GPP TS 24.008 [13] for the case when the normal attach procedure is rejected with the GMM cause with the same value.

If the UE is operating in single-registration mode, the UE shall in addition handle the 5GMM parameters 5GMM state, 5GS update status, 5G-GUTI, last visited registered TAI, TAI list, ngKSI and registration attempt counter as specified in 3GPP TS 24.501 [54] for the case when the initial registration procedure performed over 3GPP access is rejected with the 5GMM cause with the same value.

#14 (EPS services not allowed in this PLMN);

The UE shall set the EPS update status to EU3 ROAMING NOT ALLOWED (and shall store it according to clause 5.1.3.3) and shall delete any GUTI, last visited registered TAI, TAI list and eKSI. Additionally, the UE shall delete the list of equivalent PLMNs and reset the attach attempt counter.

In S1 mode, the UE shall store the PLMN identity in the "forbidden PLMNs for GPRS service" list. Additionally, the UE shall enter state EMM-DEREGISTERED.PLMN-SEARCH and if the UE is configured to use timer T3245 (see 3GPP TS 24.368 [15A] or 3GPP TS 31.102 [17]) then the UE shall start timer T3245 and proceed as described in clause 5.3.7a. The UE shall perform a PLMN selection according to 3GPP TS 23.122 [6]. If the message has been successfully integrity checked by the NAS and the UE maintains a PLMN-specific PS-attempt counter for that PLMN, then the UE shall set this counter to the UE implementation-specific maximum value.

In S101 mode, the UE shall store the PLMN identity provided with the indication from the lower layers to prepare for an S101 mode to S1 mode handover in the list of "forbidden PLMNs for attach in S101 mode" and enter the state EMM-DEREGISTERED.NO-CELL-AVAILABLE and if the UE is configured to use timer T3245 (see 3GPP TS 24.368 [15A] or 3GPP TS 31.102 [17]) then the UE shall start timer T3245 and proceed as described in clause 5.3.7a.

If A/Gb mode or Iu mode is supported by the UE, the UE shall in addition handle the GMM parameters GMM state, GPRS update status, P-TMSI, P-TMSI signature, RAI, GPRS ciphering key sequence number and GPRS attach attempt counter as specified in 3GPP TS 24.008 [13] for the case when the normal attach procedure is rejected with the GMM cause with the same value.

If the UE is operating in single-registration mode, the UE shall in addition set the 5GMM state to 5GMM-DEREGISTERED, 5GS update status to 5U3 ROAMING NOT ALLOWED, and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI. Additionally, the UE shall reset the registration attempt counter.

#15 (No suitable cells in tracking area);

The UE shall set the EPS update status to EU3 ROAMING NOT ALLOWED (and shall store it according to clause 5.1.3.3) and shall delete any GUTI, last visited registered TAI, TAI list and eKSI. Additionally, the UE shall reset the attach attempt counter.

The UE shall store the current TAI in the list of "forbidden tracking areas for roaming". If the ATTACH REJECT message is not integrity protected, the UE shall memorize the current TAI was stored in the list of "forbidden tracking areas for roaming" for non-integrity protected NAS reject message. Additionally, the UE shall enter the state EMM-DEREGISTERED.LIMITED-SERVICE and:

- if the UE is in WB-S1 mode and the Extended EMM cause IE with value "E-UTRAN not allowed" is included in the ATTACH REJECT message, the UE supports "E-UTRA Disabling for EMM cause #15", and the "E-UTRA Disabling Allowed for EMM cause #15" parameter as specified in 3GPP TS 24.368 [15A] or 3GPP TS 31.102 [17] is present and set to enabled; then the UE shall disable the E-UTRA capability as specified in clause 4.5 and search for a suitable cell in GERAN, UTRAN or NG-RAN radio access technology;

- if the UE is in NB-S1 mode and the Extended EMM cause IE with value "NB-IoT not allowed" is included in the ATTACH REJECT message, then the UE may disable the NB-IoT capability as specified in clause 4.9 and search for a suitable cell in E-UTRAN radio access technology;

- otherwise, the UE shall search for a suitable cell in another tracking area or in another location area according to 3GPP TS 36.304 [21].

In S101 mode, the UE shall store the PLMN identity provided with the indication from the lower layers to prepare for an S101 mode to S1 mode handover in the list of "forbidden PLMNs for attach in S101 mode" and enter the state EMM-DEREGISTERED.NO-CELL-AVAILABLE and if the UE is configured to use timer T3245 (see 3GPP TS 24.368 [15A] or 3GPP TS 31.102 [17]) then the UE shall start timer T3245 and proceed as described in clause 5.3.7a.

If A/Gb mode or Iu mode is supported by the UE, the UE shall in addition handle the GMM parameters GMM state, GPRS update status, P-TMSI, P-TMSI signature, RAI, GPRS ciphering key sequence number and GPRS attach attempt counter as specified in 3GPP TS 24.008 [13] for the case when the normal attach procedure is rejected with the GMM cause with the same value.

If the UE is operating in single-registration mode, the UE shall in addition handle the 5GMM parameters 5GMM state, 5GS update status, 5G-GUTI, last visited registered TAI, TAI list, ngKSI and registration attempt counter as specified in 3GPP TS 24.501 [54] for the case when the initial registration procedure performed over 3GPP access is rejected with the 5GMM cause with the same value.

#22 (Congestion);

If the T3346 value IE is present in the ATTACH REJECT message and the value indicates that this timer is neither zero nor deactivated, the UE shall proceed as described below; otherwise it shall be considered as an abnormal case and the behaviour of the UE for this case is specified in clause 5.5.1.2.6.

The UE shall abort the attach procedure, reset the attach attempt counter, set the EPS update status to EU2 NOT UPDATED and enter state EMM-DEREGISTERED.ATTEMPTING-TO-ATTACH.

The UE shall stop timer T3346 if it is running.

If the ATTACH REJECT message is integrity protected, the UE shall start timer T3346 with the value provided in the T3346 value IE.

If the ATTACH REJECT message is not integrity protected, the UE shall start timer T3346 with a random value from the default range specified in 3GPP TS 24.008 [13].

The UE stays in the current serving cell and applies the normal cell reselection process. The attach procedure is started if still needed when timer T3346 expires or is stopped.

If A/Gb mode or Iu mode is supported by the UE, the UE shall in addition handle the GMM parameters GMM state, GPRS update status and GPRS attach attempt counter as specified in 3GPP TS 24.008 [13] for the case when the normal attach procedure is rejected with the GMM cause with the same value.

If the UE is operating in single-registration mode, the UE shall in addition handle the 5GMM parameters 5GMM state, 5GS update status and registration attempt counter as specified in 3GPP TS 24.501 [54] for the case when the initial registration procedure performed over 3GPP access is rejected with the 5GMM cause with the same value.

#25 (Not authorized for this CSG);

EMM cause #25 is only applicable when received from a CSG cell. EMM cause #25 received from a non-CSG cell is considered as an abnormal case and the behaviour of the UE is specified in clause 5.5.1.2.6.

The UE shall set the EPS update status to EU3 ROAMING NOT ALLOWED (and store it according to clause 5.1.3.3). Additionally, the UE shall reset the attach attempt counter and shall enter the state EMM-DEREGISTERED.LIMITED-SERVICE.

If the CSG ID and associated PLMN identity of the cell where the UE has sent the ATTACH REQUEST message are contained in the Allowed CSG list, the UE shall remove the entry corresponding to this CSG ID and associated PLMN identity from the Allowed CSG list.

If the CSG ID and associated PLMN identity of the cell where the UE has sent the ATTACH REQUEST message are contained in the Operator CSG list, the UE shall apply the procedures defined in 3GPP TS 23.122 [6] clause 3.1A.

The UE shall search for a suitable cell according to 3GPP TS 36.304 [21].

If A/Gb mode or Iu mode is supported by the UE, the UE shall in addition handle the GMM parameters GMM state, GPRS update status and GPRS attach attempt counter as specified in 3GPP TS 24.008 [13] for the case when the normal attach procedure is rejected with the GMM cause with the same value.

If the UE is operating in single-registration mode, the UE shall in addition set the 5GMM state to 5GMM-DEREGISTERED and set the 5GS update status to 5U3 ROAMING NOT ALLOWED and reset the registration attempt counter.

#31 (Redirection to 5GCN required);

EMM cause #31 received by a UE that has not indicated support for CIoT optimizations or not indicated support for N1 mode is considered as an abnormal case and the behaviour of the UE is specified in clause 5.5.1.2.6.

The UE shall set the EPS update status to EU3 ROAMING NOT ALLOWED (and shall store it according to clause 5.1.3.3) and shall delete any GUTI, last visited registered TAI, TAI list and eKSI. Additionally, the UE shall reset the attach attempt counter.

The UE shall enable N1 mode capability for 3GPP access if it was disabled and disable the E-UTRA capability (see clause 4.5) and enter state EMM-DEREGISTERED.NO-CELL-AVAILABLE.

If the UE is operating in single-registration mode, the UE shall in addition handle the 5GMM parameters 5GMM state, 5GS update status, 5G-GUTI, last visited registered TAI, TAI list, ngKSI and registration attempt counter as specified in 3GPP TS 24.501 [54] for the case when the initial registration procedure performed over 3GPP access is rejected with the 5GMM cause with the same value.

#42 (Severe network failure);

The UE shall set the EPS update status to EU2 NOT UPDATED, and shall delete any GUTI, last visited registered TAI, TAI list, eKSI, and list of equivalent PLMNs, and set the attach attempt counter to 5. The UE shall start an implementation specific timer setting its value to 2 times the value of T as defined in 3GPP TS 23.122 [6]. While this timer is running, the UE shall not consider the PLMN + RAT combination that provided this reject cause a candidate for PLMN selection. The UE then enters state EMM-DEREGISTERED.PLMN-SEARCH in order to perform a PLMN selection according to 3GPP TS 23.122 [6].

If A/Gb mode or Iu mode is supported by the UE, the UE shall in addition set the GMM state to GMM-DEREGISTERED, GPRS update status to GU2 NOT UPDATED, and shall delete the P-TMSI, P-TMSI signature, RAI and GPRS ciphering key sequence number.

If the UE is operating in single-registration mode, the UE shall in addition set the 5GMM state to 5GMM-DEREGISTERED, 5GS update status to 5U2 NOT UPDATED, and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI.

#78 (PLMN not allowed to operate at the present UE location).

This cause value received from a non-satellite E-UTRA cell is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.2.6.

The UE shall set the EPS update status to EU3 ROAMING NOT ALLOWED (and shall store it according to clause 5.1.3.3) and shall delete any GUTI, last visited registered TAI, TAI list and eKSI. Additionally, the UE shall reset the registration attempt counter and shall enter state EMM-DEREGISTERED.PLMN-SEARCH and perform a PLMN selection according to 3GPP TS 23.122 [6].

Editor's note: [IoT\_SAT\_ARCH\_EPS, CR#3620]. It is FFS how to prevent the UE from making repeated attempts at selecting the same satellite access PLMN if there are no other available PLMNs at UE's location.

Other values are considered as abnormal cases. The behaviour of the UE in those cases is specified in clause 5.5.1.2.6.

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

##### 5.5.1.2.6 Abnormal cases in the UE

The following abnormal cases can be identified:

a) Access barred because of access class barring, EAB, ACDC or NAS signalling connection establishment rejected by the network without "Extended wait time" received from lower layers

In WB-S1 mode, if access is barred for "originating signalling" (see 3GPP TS 36.331 [22]), the attach procedure shall not be started. The UE stays in the current serving cell and applies the normal cell reselection process. The attach procedure is started as soon as possible, i.e. when access for "originating signalling" is granted on the current cell or when the UE moves to a cell where access for "originating signalling" is granted.

In NB-S1 mode, if access is barred for "originating signalling" (see 3GPP TS 36.331 [22]), the attach procedure shall not be started. The UE stays in the current serving cell and applies the normal cell reselection process. Further UE behaviour is implementation specific, e.g. the attach procedure is started again after an implementation dependent time.

In NB-S1 mode, if access is barred for "originating signalling" (see 3GPP TS 36.331 [22]), a request for an exceptional event is received from the upper layers, then the attach procedure shall be started.

NOTE 1: In NB-S1 mode, the EMM layer cannot receive the access barring alleviation indication from the lower layers (see 3GPP TS 36.331 [22]).

If access is barred because of access class barring for "originating signalling" (see 3GPP TS 36.331 [22]), ACDC is applicable to the request from the upper layers and the UE supports ACDC, then the attach procedure shall be started.

If access is barred for a certain ACDC category (see 3GPP TS 36.331 [22]), a request with a higher ACDC category is received from the upper layers and the UE supports ACDC, then the attach procedure shall be started.

If an access request for an uncategorized application is barred due to ACDC (see 3GPP TS 36.331 [22]), a request with a certain ACDC category is received from the upper layers and the UE supports ACDC, then the attach procedure shall be started.

b) Lower layer failure or release of the NAS signalling connection without "Extended wait time" and without "Extended wait time CP data" received from lower layers before the ATTACH ACCEPT or ATTACH REJECT message is received

The attach procedure shall be aborted, and the UE shall proceed as described below.

c) T3410 timeout

The UE shall abort the attach procedure. The NAS signalling connection, if any, shall be released locally.

NOTE 2: The NAS signalling connection can also be released if the UE deems that the network has failed the authentication check as specified in clause 5.4.2.7.

The UE shall proceed as described below.

d) ATTACH REJECT, other EMM cause values than those treated in clause 5.5.1.2.5, and cases of EMM cause values #22, #25, #31 and #78, if considered as abnormal cases according to clause 5.5.1.2.5

Upon reception of the EMM cause #19 "ESM failure", if the UE is not configured for NAS signalling low priority and the ESM cause value received in the PDN CONNECTIVITY REJECT message is not #54 "PDN connection does not exist", the UE may set the attach attempt counter to 5. Subsequently, if the UE needs to retransmit the ATTACH REQUEST message to request PDN connectivity towards a different APN, the UE may stop T3411 or T3402, if running, and send the ATTACH REQUEST message. If the UE needs to attempt EPS attach to request transfer of a PDN connection for emergency bearer services by including a PDN CONNECTIVITY REQUEST message with request type set to "handover of emergency bearer services", the UE shall stop T3411 or T3402, if running, and send the ATTACH REQUEST message.

NOTE 3: When receiving EMM cause #19 "ESM failure", coordination is required between the EMM and ESM sublayers in the UE to determine whether to set the attach attempt counter to 5.

If the attach request is neither for emergency bearer services nor for initiating a PDN connection for emergency bearer services with attach type not set to "EPS emergency attach", upon reception of the EMM causes #95, #96, #97, #99 and #111 the UE should set the attach attempt counter to 5.

The UE shall proceed as described below.

e) Change of cell into a new tracking area

If a cell change into a new tracking area occurs before the attach procedure is completed, the attach procedure shall be aborted and re-initiated immediately. If a tracking area border is crossed when the ATTACH ACCEPT message has been received but before an ATTACH COMPLETE message is sent, the attach procedure shall be re-initiated. If a GUTI was allocated during the attach procedure, this GUTI shall be used in the attach procedure.

f) Mobile originated detach required

The attach procedure shall be aborted, and the UE initiated detach procedure shall be performed.

g) Detach procedure collision

If the UE receives a DETACH REQUEST message from the network in state EMM-REGISTERED-INITIATED and the detach type indicates "re-attach not required" and no EMM cause IE, or "re-attach not required" and the EMM cause value is not #2 "IMSI unknown in HSS", the detach procedure shall be progressed and the attach procedure shall be aborted. If the UE receives a DETACH REQUEST message from the network in state EMM-REGISTERED-INITIATED and the detach type indicates "re-attach required", the detach procedure shall be progressed and the UE shall locally release the NAS signalling connection, before re-initiating the attach procedure. Otherwise the attach procedure shall be progressed and the DETACH REQUEST message shall be ignored.

h) Transmission failure of ATTACH REQUEST message indication from lower layers

The UE shall restart the attach procedure immediately.

i) Transmission failure of ATTACH COMPLETE message indication from lower layers

If the current TAI is not in the TAI list, the UE shall restart the attach procedure.

If the current TAI is still in the TAI list, it is up to the UE implementation how to re-run the ongoing procedure. The EMM sublayer notifies the ESM sublayer that the ESM message in the ESM message container IE of the ATTACH COMPLETE has failed to be transmitted.

j) If EMM-REGISTERED without PDN connection is not supported by the UE or the MME, and the ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST message combined with the ATTACH ACCEPT is not accepted by the UE due to failure in the UE ESM sublayer, then the UE shall initiate the detach procedure by sending a DETACH REQUEST message to the network. Further UE behaviour is implementation specific.

If EMM-REGISTERED without PDN connection is supported by the UE and the MME, and the ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST message combined with the ATTACH ACCEPT is not accepted by the UE due to failure in the UE ESM sublayer, then the UE shall either send an ATTACH COMPLETE message together with an ACTIVATE DEFAULT EPS BEARER CONTEXT REJECT contained in the ESM message container information element to the network or initiate the detach procedure by sending a DETACH REQUEST message. Further UE behaviour is implementation specific.

k) Indication from the lower layers that an S101 mode to S1 mode handover has been cancelled (S101 mode only)

The UE shall abort the attach procedure and enter state EMM-DEREGISTERED.NO-CELL-AVAILABLE.

l) "Extended wait time" from the lower layers

If the ATTACH REQUEST message contained the low priority indicator set to "MS is configured for NAS signalling low priority", the UE shall start timer T3346 with the "Extended wait time" value and reset the attach attempt counter.

If the ATTACH REQUEST message did not contain the low priority indicator set to "MS is configured for NAS signalling low priority", the UE is operating in NB-S1 mode and the UE is not a UE configured to use AC11 – 15 in selected PLMN, then the UE shall start timer T3346 with the "Extended wait time" value and reset the attach attempt counter.

In other cases the UE shall ignore the "Extended wait time".

The UE shall abort the attach procedure, stay in the current serving cell, change the state to EMM-DEREGISTERED.ATTEMPTING-TO-ATTACH and apply the normal cell reselection process.

The UE shall proceed as described below.

la) "Extended wait time CP data" from the lower layers

If the UE is operating in NB-S1 mode, the UE shall start the timer T3346 with the "Extended wait time CP data" value and reset the attach attempt counter.

In other cases the UE shall ignore the "Extended wait time CP data".

The UE shall abort the attach procedure, stay in the current serving cell, change the state to EMM-DEREGISTERED.ATTEMPTING-TO-ATTACH and apply the normal cell reselection process.

The UE shall proceed as described below.

m) Timer T3346 is running

The UE shall not start the attach procedure unless:

- the UE is a UE configured to use AC11 – 15 in selected PLMN;

- the UE needs to attach for emergency bearer services;

- the UE in NB-S1 mode is requested by the upper layer to transmit user data related to an exceptional event and

i) the UE is allowed to use exception data reporting (see the ExceptionDataReportingAllowed leaf of the NAS configuration MO in 3GPP TS 24.368 [15A] or the USIM file EFNASCONFIG in 3GPP TS 31.102 [17]); and

ii) timer T3346 was not started when NAS signalling connection was established with RRC establishment cause set to "MO exception data"; or

- the UE needs to attach without the NAS signalling low priority indication and if the timer T3346 was started due to rejection of a NAS request message (e.g. ATTACH REQUEST, TRACKING AREA UPDATE REQUEST or EXTENDED SERVICE REQUEST) which contained the low priority indicator set to "MS is configured for NAS signalling low priority".

The UE stays in the current serving cell and applies the normal cell reselection process.

NOTE 4: It is considered an abnormal case if the UE needs to initiate an attach procedure while timer T3346 is running independent on whether timer T3346 was started due to an abnormal case or a non successful case.

The UE shall proceed as described below.

n) If EMM-REGISTERED without PDN connection is supported by the UE and the MME, an ESM DUMMY MESSAGE is included in the ESM message container information element of the ATTACH REQUEST message and the UE receives the ATTACH ACCEPT message combined with a PDN CONNECTIVITY REJECT message, the UE shall send an ATTACH COMPLETE message together with an ESM DUMMY MESSAGE contained in the ESM message container information element to the network. Further UE behaviour is implementation specific.

o) Timer T3447 is running

The UE shall not start the attach procedure unless:

- the UE is a UE configured to use AC11 – 15 in selected PLMN;

- the UE attempts to attach for emergency bearer services; or

- the UE attempts to attach without PDN connection request.

The UE stays in the current serving cell and applies the normal cell reselection process. The attach request procedure is started, if still necessary, when timer T3447 expires.

For the cases b, c, d, l, la and m:

- Timer T3410 shall be stopped if still running.

- For the cases b, c, d, l when the "Extended wait time" is ignored, and la when the "Extended wait time CP data" is ignored, if the attach request is neither for emergency bearer services nor for initiating a PDN connection for emergency bearer services with attach type not set to "EPS emergency attach", the attach attempt counter shall be incremented, unless it was already set to 5.

- If the attach attempt counter is less than 5:

- for the cases l, la and m, the attach procedure is started, if still necessary, when timer T3346 expires or is stopped;

- for the cases b, c, d, l when the "Extended wait time" is ignored, and la when the "Extended wait time CP data" is ignore, if the attach request is neither for emergency bearer services nor for initiating a PDN connection for emergency bearer services with attach type not set to "EPS emergency attach", timer T3411 is started and the state is changed to EMM-DEREGISTERED.ATTEMPTING-TO-ATTACH. When timer T3411 expires the attach procedure shall be restarted, if still required by ESM sublayer.

- If the attach attempt counter is equal to 5:

- the UE shall delete any GUTI, TAI list, last visited registered TAI, list of equivalent PLMNs and KSI, shall set the update status to EU2 NOT UPDATED, and shall start timer T3402. The state is changed to EMM-DEREGISTERED.ATTEMPTING-TO-ATTACH or optionally to EMM-DEREGISTERED.PLMN-SEARCH in order to perform a PLMN selection according to 3GPP TS 23.122 [6]; and

- if A/Gb mode, Iu mode or N1 mode is supported by the UE:

- if A/Gb mode or Iu mode is supported by the UE, the UE shall in addition handle the GMM parameters GMM state, GPRS update status, P-TMSI, P-TMSI signature, RAI and GPRS ciphering key sequence number as specified in 3GPP TS 24.008 [13] for the abnormal case when a normal attach procedure fails and the attach attempt counter is equal to 5;

- if the UE is operating in single-registration mode, the UE shall in addition handle the 5GMM parameters 5GMM state, 5GS update status, 5G-GUTI, last visited registered TAI, TAI list and ngKSI as specified in 3GPP TS 24.501 [54] for the abnormal case when an initial registration procedure performed over 3GPP access fails and the registration attempt counter is equal to 5; and

- the UE shall attempt to select GERAN, UTRAN or NG-RAN radio access technology and proceed with appropriate GMM or 5GMM specific procedures. Additionally, if the UE selects GERAN or UTRAN radio access technology, the UE may disable the E-UTRA capability as specified in clause 4.5. If No E-UTRA Disabling In 5GS is enabled at the UE (see 3GPP TS 24.368 [50]) and the UE selects NG-RAN radio access technology, it shall not disable the E-UTRA capability; otherwise, the UE may disable the E-UTRA capability as specified in clause 4.5.

NOTE 5: Whether the UE requests RRC to treat the active E-UTRA cell as barred (see 3GPP TS 36.304 [21]) is left to the UE implementation.

Editor's note: It is FFS whether a USIM file for the No E-UTRA Disabling In 5GS configuration is needed.

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

##### 5.5.2.3.1 Network initiated detach procedure initiation

The network initiates the detach procedure by sending a DETACH REQUEST message to the UE (see example in figure 5.5.2.3.1).

NOTE: If the MME performs a local detach, it will inform the UE with an EMM messages (e.g. SERVICE REJECT or TRACKING AREA UPDATE reject) with EMM cause #10 "implicitly detached" only when the UE initiates an EMM procedure.

The network may include an EMM cause IE to specify the reason for the detach request. The network shall start timer T3422. If the Detach type IE indicates "re-attach required" or "re-attach not required" and the EMM cause value is not #2 "IMSI unknown in HSS", or if the MME performs a local detach, the MME shall either store the current EPS security context if it is a native EPS security context, or the MME shall delete the current EPS security context if it is a mapped EPS security context. If the detach type IE indicates "re-attach required" or "re-attach not required" and the EMM cause value is not #2 "IMSI unknown in HSS", the network shall deactivate the EPS bearer context(s), if any, for the UE locally and enter state EMM-DEREGISTERED-INITIATED.

If the network initiates the detach procedure because the network determines that the UE is in a location where the network is not allowed to operate (see 3GPP TS 23.401 [10]), the network shall set the EMM cause value in the DETACH REQUEST message to #78 "PLMN not allowed to operate at the present UE location" and may include an information element in the DETACH REQUEST message to indicate the country of the UE location.

Editor's note: [IoT\_SAT\_ARCH\_EPS, CR#3620]: The name and the encoding of the information element providing the country of the UE location is FFS.

Editor's note [IoT\_SAT\_ARCH\_EPS, CR#3620]: It is FFS if and how the HPLMN can influence the validity and use of the indication of country of UE location in the UE.



Figure 5.5.2.3.1: Network initiated detach procedure

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

##### 5.5.2.3.2 Network initiated detach procedure completion by the UE

When receiving the DETACH REQUEST message and the detach type indicates "re-attach required", the UE shall deactivate the EPS bearer context(s), if any, including the default EPS bearer context locally without peer-to-peer signalling between the UE and the MME. The UE shall stop the timer T3346, if it is running. The UE shall also stop timer(s) T3396 and ESM back-off timer(s) not related to congestion control (see clause 6.3.6), if running. The UE shall send a DETACH ACCEPT message to the network and enter the state EMM-DEREGISTERED. Furthermore, the UE shall, after the completion of the detach procedure, and the release of the existing NAS signalling connection, initiate an attach or combined attach procedure. The UE should also re-establish any previously established PDN connection(s).

NOTE 1: When the detach type indicates "re-attach required", user interaction is necessary in some cases when the UE cannot re-activate the EPS bearer(s), if any, automatically.

A UE which receives a DETACH REQUEST message with detach type indicating "re-attach required" or "re-attach not required" and no EMM cause IE, is detached only for EPS services.

When receiving the DETACH REQUEST message and the detach type indicates "IMSI detach", the UE shall not deactivate the EPS bearer context(s) including the default EPS bearer context. The UE shall set the MM update status to U2 NOT UPDATED. A UE may send a DETACH ACCEPT message to the network, and shall re-attach to non-EPS services by performing the combined tracking area updating procedure according to clause 5.5.3.3, sending a TRACKING AREA UPDATE REQUEST message with EPS update type IE indicating "combined TA/LA updating with IMSI attach".

If the UE is attached for EPS and non-EPS services, then the UE shall set the update status to U2 NOT UPDATED if:

- the Detach type IE indicates "re-attach required"; or

- the Detach type IE indicates "re-attach not required" and no EMM cause IE is included.

When receiving the DETACH REQUEST message and the detach type indicates "re-attach not required" and no EMM cause IE, or "re-attach not required" and the EMM cause value is not #2 "IMSI unknown in HSS", the UE shall deactivate the EPS bearer context(s), if any, including the default EPS bearer context locally without peer-to-peer signalling between the UE and the MME. The UE shall then send a DETACH ACCEPT message to the network and enter state EMM-DEREGISTERED.

If the detach type indicates "IMSI detach" or "re-attach required", then the UE shall ignore the EMM cause IE if received.

If the detach type indicates "re-attach not required", the UE shall take the following actions depending on the received EMM cause value:

#2 (IMSI unknown in HSS);

The UE shall handle the MM parameters update status, TMSI, LAI and ciphering key sequence number as specified in 3GPP TS 24.008 [13] for the case when a DETACH REQUEST is received with the GMM cause with the same value and with detach type set to "re-attach not required". The USIM shall be considered as invalid for non-EPS services until switching off or the UICC containing the USIM is removed or the timer T3245 expires as described in clause 5.3.7a. If the UE maintains a counter for "SIM/USIM considered invalid for non-GPRS services", then the UE shall set this counter to UE implementation-specific maximum value.

The UE is still attached for EPS services in the network.

#3 (Illegal UE);

#6 (Illegal ME); or

#8 (EPS services and non-EPS services not allowed);

The UE shall set the EPS update status to EU3 ROAMING NOT ALLOWED (and shall store it according to clause 5.1.3.3) and shall delete any GUTI, last visited registered TAI, TAI list and KSI. The UE shall consider the USIM as invalid for EPS services until switching off or the UICC containing the USIM is removed or the timer T3245 expires as described in clause 5.3.7a. The UE shall delete the list of equivalent PLMNs and shall enter the state EMM-DEREGISTERED.NO-IMSI. If the UE maintains a counter for "SIM/USIM considered invalid for GPRS services", then the UE shall set this counter to UE implementation-specific maximum value. If the UE maintains a counter for "SIM/USIM considered invalid for non-GPRS services", then the UE shall set this counter to UE implementation-specific maximum value.

If A/Gb mode or Iu mode is supported by the UE, the UE shall handle the MM parameters update status, TMSI, LAI and ciphering key sequence number and the GMM parameters GMM state, RAI, P-TMSI, P-TMSI signature, GPRS ciphering key sequence number and GPRS update status as specified in 3GPP TS 24.008 [13] for the case when a DETACH REQUEST is received with the GMM cause with the same value and with detach type set to "re-attach not required". The USIM shall also be considered as invalid for non-EPS services until switching off or the UICC containing the USIM is removed or the timer T3245 expires as described in clause 5.3.7a.

For the EMM cause value #3 or #6, if the UE is operating in single-registration mode, the UE shall handle the 5GMM parameters 5GMM state, 5GS update status, 5G-GUTI, last visited registered TAI, TAI list and ngKSI as specified in 3GPP TS 24.501 [54] for the case when a DEREGISTRATION REQUEST is received over 3GPP access with the 5GMM cause with the same value, with de-registration type set to "re-registration not required" and with access type set to "3GPP access".

For the EMM cause value #8, if the UE is operating in single-registration mode, the UE shall in addition set the 5GMM state to 5GMM-DEREGISTERED, 5GS update status to 5U3 ROAMING NOT ALLOWED, and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI.

NOTE 2: The possibility to configure a UE so that the radio transceiver for a specific radio access technology is not active, although it is implemented in the UE, is out of scope of the present specification.

#7 (EPS services not allowed);

The UE shall set the EPS update status to EU3 ROAMING NOT ALLOWED (and shall store it according to clause 5.1.3.3) and shall delete any GUTI, last visited registered TAI, TAI list and KSI. The UE shall consider the USIM as invalid for EPS services until switching off or the UICC containing the USIM is removed or the timer T3245 expires as described in clause 5.3.7a. The UE shall enter the state EMM-DEREGISTERED. If the UE maintains a counter for "SIM/USIM considered invalid for GPRS services", then the UE shall set this counter to UE implementation-specific maximum value.

If A/Gb mode or Iu mode is supported by the UE, the UE shall handle the GMM parameters GMM state, RAI, P‑TMSI, P-TMSI signature, GPRS ciphering key sequence number and GPRS update status as specified in 3GPP TS 24.008 [13] for the case when a DETACH REQUEST is received with the GMM cause with the same value and with detach type set to "re-attach not required".

A UE operating in CS/PS mode 1 or CS/PS mode 2 of operation which is IMSI attached for non-EPS services is still IMSI attached for non-EPS services in the network. The UE operating in CS/PS mode 1 or CS/PS mode 2 of operation shall set the update status to U2 NOT UPDATED, shall attempt to select GERAN or UTRAN access technology and shall proceed with the appropriate MM specific procedure according to the MM service state. The UE shall not reselect E-UTRAN radio access technology until switching off or the UICC containing the USIM is removed.

If the UE is operating in single-registration mode, the UE shall handle the 5GMM parameters 5GMM state, 5GS update status, 5G-GUTI, last visited registered TAI, TAI list and ngKSI as specified in 3GPP TS 24.501 [54] for the case when a DEREGISTRATION REQUEST is received over 3GPP access with the 5GMM cause with the same value, with de-registration type set to "re-registration not required" and with access type set to "3GPP access".

#11 (PLMN not allowed);

The UE shall set the EPS update status to EU3 ROAMING NOT ALLOWED (and shall store it according to clause 5.1.3.3) and shall delete any GUTI, last visited registered TAI, TAI list and KSI. The UE shall delete the list of equivalent PLMNs, shall reset the attach attempt counter and enter the state EMM-DEREGISTERED.PLMN-SEARCH.

The UE shall store the PLMN identity in the "forbidden PLMN list" and if the UE is configured to use timer T3245 (see 3GPP TS 24.368 [15A] or 3GPP TS 31.102 [17]) then the UE shall start timer T3245 and proceed as described in clause 5.3.7a. If the message has been successfully integrity checked by the NAS and the UE maintains a PLMN-specific attempt counter for that PLMN, then the UE shall set this counter to the UE implementation-specific maximum value.

The UE shall perform a PLMN selection according to 3GPP TS 23.122 [6].

If A/Gb mode or Iu mode is supported by the UE, the UE shall handle the MM parameters update status, TMSI, LAI and ciphering key sequence number and the GMM parameters GMM state, RAI, P-TMSI, P-TMSI signature, GPRS ciphering key sequence number, GPRS update status and GPRS attach attempt counter as specified in 3GPP TS 24.008 [13] for the case when a DETACH REQUEST is received with the GMM cause with the same value and with detach type set to "re-attach not required".

If the UE is operating in single-registration mode, the UE shall handle the 5GMM parameters 5GMM state, 5GS update status, 5G-GUTI, last visited registered TAI, TAI list, ngKSI and registration attempt counter as specified in 3GPP TS 24.501 [54] for the case when a DEREGISTRATION REQUEST is received over 3GPP access with the 5GMM cause with the same value, with de-registration type set to "re-registration not required" and with access type set to "3GPP access".

#12 (Tracking area not allowed);

The UE shall set the EPS update status to EU3 ROAMING NOT ALLOWED (and shall store it according to clause 5.1.3.3) and shall delete any GUTI, last visited registered TAI, TAI list and KSI. The UE shall reset the attach attempt counter and shall enter the state EMM-DEREGISTERED.LIMITED-SERVICE.

The UE shall store the current TAI in the list of "forbidden tracking areas for regional provision of service".

If A/Gb mode or Iu mode is supported by the UE, the UE shall handle the GMM parameters GMM state, RAI, P‑TMSI, P-TMSI signature, GPRS ciphering key sequence number, GPRS update status and GPRS attach attempt counter as specified in 3GPP TS 24.008 [13] for the case when a DETACH REQUEST is received with the GMM cause with the same value and with detach type set to "re-attach not required". If the UE is IMSI attached for non-EPS services, the UE shall in addition handle the MM parameters update status, TMSI, LAI, ciphering key sequence number and location update attempt counter as specified in 3GPP TS 24.008 [13] for the case when a DETACH REQUEST is received with the GMM cause with the same value and with detach type set to "re-attach not required".

If the UE is operating in single-registration mode, the UE shall handle the 5GMM parameters 5GMM state, 5GS update status, 5G-GUTI, last visited registered TAI, TAI list and ngKSI as specified in 3GPP TS 24.501 [54] for the case when a DEREGISTRATION REQUEST is received over 3GPP access with the 5GMM cause with the same value, with de-registration type set to "re-registration not required" and with access type set to "3GPP access".

#13 (Roaming not allowed in this tracking area);

The UE shall set the EPS update status to EU3 ROAMING NOT ALLOWED (and shall store it according to clause 5.1.3.3) and shall delete any GUTI, last visited registered TAI, TAI list and KSI. The UE shall delete the list of equivalent PLMNs, reset the attach attempt counter and shall change to state EMM-DEREGISTERED.PLMN-SEARCH.

The UE shall store the current TAI in the list of "forbidden tracking areas for roaming".

The UE shall perform a PLMN selection according to 3GPP TS 23.122 [6]

If A/Gb mode or Iu mode is supported by the UE, the UE shall handle the GMM parameters GMM state, RAI, P‑TMSI, P-TMSI signature, GPRS ciphering key sequence number, GPRS update status and GPRS attach attempt counter as specified in 3GPP TS 24.008 [13] for the case when a DETACH REQUEST is received with the GMM cause with the same value and with detach type set to "re-attach not required". If the UE is IMSI attached for non-EPS services, the UE shall in addition handle the MM parameters update status, TMSI, LAI, ciphering key sequence number and location update attempt counter and as specified in 3GPP TS 24.008 [13] for the case when a DETACH REQUEST is received with the GMM cause with the same value and with detach type set to "re-attach not required".

If the UE is operating in single-registration mode, the UE shall handle the 5GMM parameters 5GMM state, 5GS update status, 5G-GUTI, last visited registered TAI, TAI list, ngKSI and registration attempt counter as specified in 3GPP TS 24.501 [54] for the case when a DEREGISTRATION REQUEST is received over 3GPP access with the 5GMM cause with the same value, with de-registration type set to "re-registration not required" and with access type set to "3GPP access".

#14 (EPS services not allowed in this PLMN);

The UE shall set the EPS update status to EU3 ROAMING NOT ALLOWED (and shall store it according to clause 5.1.3.3). Furthermore, the UE shall delete any GUTI, last visited registered TAI, TAI list and KSI. The UE shall reset the attach attempt counter and shall enter the state EMM-DEREGISTERED.PLMN-SEARCH.

The UE shall store the PLMN identity in the "forbidden PLMNs for GPRS service" list and if the UE is configured to use timer T3245 (see 3GPP TS 24.368 [15A] or 3GPP TS 31.102 [17]) then the UE shall start timer T3245 and proceed as described in clause 5.3.7a. If the message has been successfully integrity checked by the NAS and the UE maintains a PLMN-specific PS-attempt counter for that PLMN, then the UE shall set this counter to the UE implementation-specific maximum value.

A UE in PS mode 1 or PS mode 2 of operation shall delete the list of equivalent PLMNs and perform a PLMN selection according to 3GPP TS 23.122 [6].

A UE operating in CS/PS mode 1 or CS/PS mode 2 of operation which is IMSI attached for non-EPS services is still IMSI attached for non-EPS services and shall set the update status to U2 NOT UPDATED.

A UE operating in CS/PS mode 1 of operation and supporting A/Gb mode or Iu mode may select GERAN or UTRAN radio access technology and proceed with the appropriate MM specific procedure according to the MM service state. In this case, the UE shall disable the E-UTRA capability (see clause 4.5).

A UE operating in CS/PS mode 1 of operation and supporting A/Gb mode or Iu mode may perform a PLMN selection according to 3GPP TS 23.122 [6].

A UE operating in CS/PS mode 1 of operation and supporting S1 mode only or operating in CS/PS mode 2 of operation shall delete the list of equivalent PLMNs and shall perform a PLMN selection according to 3GPP TS 23.122 [6].

If A/Gb mode or Iu mode is supported by the UE, the UE shall handle the GMM parameters GMM state, GPRS update status, RAI, P-TMSI, P-TMSI signature, GPRS ciphering key sequence number and GPRS attach attempt counter as specified in 3GPP TS 24.008 [13] for the case when a DETACH REQUEST is received with the GMM cause with the same value and with detach type set to "re-attach not required".

If the UE is operating in single-registration mode, the UE shall in addition set the 5GMM state to 5GMM-DEREGISTERED, 5GS update status to 5U3 ROAMING NOT ALLOWED, and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI. Additionally, the UE shall reset the registration attempt counter.

#15 (No suitable cells in tracking area);

The UE shall set the EPS update status to EU3 ROAMING NOT ALLOWED (and shall store it according to clause 5.1.3.3) and shall delete any GUTI, last visited registered TAI, TAI list and KSI. The UE shall reset the attach attempt counter and shall enter the state EMM-DEREGISTERED.LIMITED-SERVICE.

The UE shall store the current TAI in the list of "forbidden tracking areas for roaming".

The UE shall search for a suitable cell in another tracking area or in another location area according to 3GPP TS 36.304 [21].

If A/Gb mode or Iu mode is supported by the UE, the UE shall handle the GMM parameters GMM state, RAI, P‑TMSI, P-TMSI signature, GPRS ciphering key sequence number, GPRS update status and GPRS attach attempt counter as specified in 3GPP TS 24.008 [13] for the case when a DETACH REQUEST is received with the GMM cause with the same value and with detach type set to "re-attach not required". If the UE is IMSI attached for non-EPS services, the UE shall in addition handle the MM parameters update status, TMSI, LAI, ciphering key sequence number and location update attempt counter as specified in 3GPP TS 24.008 [13] for the case when a DETACH REQUEST is received with the GMM cause with the same value and with detach type set to "re-attach not required".

If the UE is operating in single-registration mode, the UE shall handle the 5GMM parameters 5GMM state, 5GS update status, 5G-GUTI, last visited registered TAI, TAI list, ngKSI and registration attempt counter as specified in 3GPP TS 24.501 [54] for the case when a DEREGISTRATION REQUEST is received over 3GPP access with the 5GMM cause with the same value, with de-registration type set to "re-registration not required" and with access type set to "3GPP access".

#25 (Not authorized for this CSG);

The UE shall set the EPS update status to EU3 ROAMING NOT ALLOWED (and shall store it according to clause 5.1.3.3). The UE shall reset the attach attempt counter and shall enter the state EMM-DEREGISTERED.LIMITED-SERVICE.

If the cell where the UE has received the DETACH REQUEST message is a CSG cell and the CSG ID and associated PLMN identity of the cell are contained in the Allowed CSG list, the UE shall remove the entry corresponding to this CSG ID and associated PLMN identity from the Allowed CSG list.

If the cell where the UE has received the DETACH REQUEST message is a CSG cell and the CSG ID and associated PLMN identity of the cell are contained in the Operator CSG list, the UE shall apply the procedures defined in 3GPP TS 23.122 [6] clause 3.1A.

The UE shall search for a suitable cell according to 3GPP TS 36.304 [21].

If A/Gb mode or Iu mode is supported by the UE, the UE shall handle the GMM parameters GMM state, GPRS update status and GPRS attach attempt counter as specified in 3GPP TS 24.008 [13] for the case when a DETACH REQUEST is received with GMM cause with the same value and with detach type set to "re-attach not required". If the UE is IMSI attached for non-EPS services, the UE shall in addition handle the MM parameters update status and location update attempt counter as specified in 3GPP TS 24.008 [13] for the case when a DETACH REQUEST is received with the GMM cause with the same value and with detach type set to "re-attach not required".

If the UE is operating in single-registration mode, the UE shall in addition set the 5GMM state to 5GMM-DEREGISTERED and set the 5GS update status to 5U3 ROAMING NOT ALLOWED and reset the registration attempt counter.

#78 (PLMN not allowed to operate at the present UE location).

This cause value received from a non-satellite E-UTRA cell is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.2.3.4.

The UE shall set the EPS update status to EU3 ROAMING NOT ALLOWED (and shall store it according to clause 5.1.3.3) and shall delete any GUTI, last visited registered TAI, TAI list and eKSI. Additionally, the UE shall reset the registration attempt counter and shall enter state EMM-DEREGISTERED.PLMN-SEARCH and perform a PLMN selection according to 3GPP TS 23.122 [6].

Editor's note: [IoT\_SAT\_ARCH\_EPS, CR#3620]. It is FFS how to prevent the UE from making repeated attempts at selecting the same satellite access PLMN if there are no other available PLMNs at UE's location.

Other EMM cause values or if no EMM cause IE is included is considered as abnormal cases. The behaviour of the UE in those cases is described in clause 5.5.2.3.4.

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

##### 5.5.3.2.5 Normal and periodic tracking area updating procedure not accepted by the network

If the tracking area updating cannot be accepted by the network, the MME sends a TRACKING AREA UPDATE REJECT message to the UE including an appropriate EMM cause value.

If a tracking area update request from a UE with a LIPA PDN connection is not accepted due to the reasons specified in clause 5.5.3.2.4, the MME shall send the TRACKING AREA UPDATE REJECT message with EMM cause value #10 "Implicitly detached".

If the tracking area update request is rejected due to general NAS level mobility management congestion control, the network shall set the EMM cause value to #22 "congestion" and assign a value for back-off timer T3346.

In NB-S1 mode, if the tracking area update request is rejected due to operator determined barring (see 3GPP TS 29.272 [16C]), the network shall set the EMM cause value to #22 "congestion" and assign a value for back-off timer T3346.

If the tracking area request is rejected due to service gap control as specified in clause 5.3.17 i.e. the T3447 timer is running, the network shall set the EMM cause value to #22 "congestion" and may assign a back-off timer T3346 with the remaining time of the running T3447 timer.

If the tracking area update request is rejected due to incompatibility between the CIoT EPS optimizations supported by the UE and what the network supports and the network sets the EMM cause value to #15 "no suitable cells in tracking area", the network may additionally include the Extended EMM cause IE with value "requested EPS optimization not supported".

NOTE 1: How the UE uses the Extended EMM cause IE with value "requested EPS optimization not supported" is implementation specific. The UE still behaves according to the EMM cause value #15.

Based on operator policy, if the tracking area update request is rejected due to core network redirection for CIoT optimizations, the network shall set the EMM cause value to #31 "Redirection to 5GCN required".

NOTE 2: The network can take into account the UE's N1 mode capability, the 5GS CIoT network behaviour supported by the UE or the 5GS CIoT network behaviour supported by the 5GCN to determine the rejection with the EMM cause value #31 "Redirection to 5GCN required".

If the UE initiated the tracking area updating procedure due to inter-system change from N1 mode to S1 mode, and the MME does not support N26 interface, the MME shall send a TRACKING AREA UPDATE REJECT message with EMM cause value #9 "UE identity cannot be derived by the network".

When the UE performs inter-system change from N1 mode to S1 mode, if the MME is informed that verification of the integrity protection of the TRACKING AREA UPDATE REQUEST message has failed in the AMF, then:

a) If the MME can retrieve the current EPS security context as indicated by the eKSI and GUTI sent by the UE, the MME shall proceed as specified in clause 5.5.3.2.4;

b) if the MME cannot retrieve the current EPS security context as indicated by the eKSI and GUTI sent by the UE, or the eKSI or GUTI was not sent by the UE, the MME may initiate the identification procedure by sending the IDENTITY REQUEST message with the "Type of identity" of the Identity type IE set to "IMSI" before taking actions as specified in clause 4.4.4.3; or

c) If the MME needs to reject the tracking area updating procedure, the MME shall send a TRACKING AREA UPDATE REJECT message with EMM cause value #9 "UE identity cannot be derived by the network".

If the tracking area updating request is from a UE via a satellite E-UTRA cell and the network using the User Location Information provided by the eNodeB (see 3GPP TS 36.413 [23]), is able to determine that the UE is in a location where the network is not allowed to operate, the network shall set the EMM cause value in the TRACKING AREA UPDATE REJECT message to #78 "PLMN not allowed to operate at the present UE location" and may include an information element in the TRACKING AREA UPDATE REJECT message message to indicate the country of the UE location.

Editor's note: [IoT\_SAT\_ARCH\_EPS, CR#3620]. The name and the encoding of the information element providing the country of the UE location is FFS.

Editor's note [IoT\_SAT\_ARCH\_EPS, CR#3620]: It is FFS if and how the HPLMN can influence the validity and use of the indication of country of UE location in the UE.

Upon receiving the TRACKING AREA UPDATE REJECT message, if the message is integrity protected or contains a reject cause other than EMM cause value #25, the UE shall stop timer T3430 and stop any transmission of user data.

If the TRACKING AREA UPDATE REJECT message with EMM cause #25 was received without integrity protection, then the UE shall discard the message.

The UE shall take the following actions depending on the EMM cause value received in the TRACKING AREA UPDATE REJECT message.

#3 (Illegal UE);

#6 (Illegal ME); or

#8 (EPS services and non-EPS services not allowed);

The UE shall set the EPS update status to EU3 ROAMING NOT ALLOWED (and shall store it according to clause 5.1.3.3) and shall delete any GUTI, last visited registered TAI, TAI list and eKSI. The UE shall consider the USIM as invalid for EPS services until switching off or the UICC containing the USIM is removed or the timer T3245 expires as described in clause 5.3.7a. The UE shall delete the list of equivalent PLMNs and shall enter the state EMM-DEREGISTERED.NO-IMSI. If the message has been successfully integrity checked by the NAS and the UE maintains a counter for "SIM/USIM considered invalid for GPRS services", then the UE shall set this counter to UE implementation-specific maximum value.

If A/Gb mode or Iu mode is supported by the UE, the UE shall handle the GMM parameters GMM state, GPRS update status, P-TMSI, P-TMSI signature, RAI and GPRS ciphering key sequence number and the MM parameters update status, TMSI, LAI and ciphering key sequence number as specified in 3GPP TS 24.008 [13] for the case when the normal routing area updating procedure is rejected with the GMM cause with the same value. The USIM shall be considered as invalid also for non-EPS services until switching off or the UICC containing the USIM is removed or the timer T3245 expires as described in clause 5.3.7a. If the message has been successfully integrity checked by the NAS and the UE maintains a counter for "SIM/USIM considered invalid for non-GPRS services", then the UE shall set this counter to UE implementation-specific maximum value.

For the EMM cause value #3 or #6, if the UE is operating in single-registration mode, the UE shall in addition handle the 5GMM parameters 5GMM state, 5GS update status, 5G-GUTI, last visited registered TAI, TAI list and ngKSI as specified in 3GPP TS 24.501 [54] for the case when the registration procedure for mobility and periodic registration update performed over 3GPP access and indicating "mobility registration updating" in the 5GS registration type IE of the REGISTRATION REQUEST message is rejected with the 5GMM cause with the same value.

For the EMM cause value #8, if the UE is operating in single-registration mode, the UE shall in addition set the 5GMM state to 5GMM-DEREGISTERED, 5GS update status to 5U3 ROAMING NOT ALLOWED, and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI.

NOTE 3: The possibility to configure a UE so that the radio transceiver for a specific radio access technology is not active, although it is implemented in the UE, is out of scope of the present specification.

#7 (EPS services not allowed);

The UE shall set the EPS update status to EU3 ROAMING NOT ALLOWED (and shall store it according to clause 5.1.3.3) and shall delete any GUTI, last visited registered TAI, TAI list and eKSI. The UE shall consider the USIM as invalid for EPS services until switching off or the UICC containing the USIM is removed or the timer T3245 expires as described in clause 5.3.7a. The UE shall enter the state EMM-DEREGISTERED. If the message has been successfully integrity checked by the NAS and the UE maintains a counter for "SIM/USIM considered invalid for GPRS services", then the UE shall set this counter to UE implementation-specific maximum value.

If the EPS update type is "periodic updating", a UE operating in CS/PS mode 1 or CS/PS mode 2 of operation, which is IMSI attached for non-EPS services, is still IMSI attached for non-EPS services. The UE operating in CS/PS mode 1 or CS/PS mode 2 of operation shall set the update status to U2 NOT UPDATED, shall attempt to select GERAN or UTRAN radio access technology and shall proceed with appropriate MM specific procedure according to the MM service state. The UE shall not reselect E‑UTRAN radio access technology until switching off or the UICC containing the USIM is removed.

If A/Gb mode or Iu mode is supported by the UE, the UE shall handle the GMM parameters GMM state, GPRS update status, P-TMSI, P-TMSI signature, RAI and GPRS ciphering key sequence number as specified in 3GPP TS 24.008 [13] for the case when the normal routing area updating procedure is rejected with the GMM cause with the same value.

If the UE is operating in single-registration mode, the UE shall in addition handle the 5GMM parameters 5GMM state, 5GS update status, 5G-GUTI, last visited registered TAI, TAI list and ngKSI as specified in 3GPP TS 24.501 [54] for the case when the registration procedure for mobility and periodic registration update performed over 3GPP access and indicating "mobility registration updating" in the 5GS registration type IE of the REGISTRATION REQUEST message is rejected with the 5GMM cause with the same value.

#9 (UE identity cannot be derived by the network);

The UE shall set the EPS update status to EU2 NOT UPDATED (and shall store it according to clause 5.1.3.3) and shall delete any GUTI, last visited registered TAI, TAI list and eKSI. The UE shall enter the state EMM-DEREGISTERED.NORMAL-SERVICE.

If the rejected request was not for initiating a PDN connection for emergency bearer services, the UE shall subsequently, automatically initiate the attach procedure.

NOTE 4: User interaction is necessary in some cases when the UE cannot re-activate the EPS bearer(s) automatically.

If A/Gb mode or Iu mode is supported by the UE, the UE shall handle the GMM parameters GMM state, GPRS update status, P-TMSI, P-TMSI signature, RAI and GPRS ciphering key sequence number as specified in 3GPP TS 24.008 [13] for the case when the normal routing area updating procedure is rejected with the GMM cause with the same value.

If the UE is operating in the single-registration mode, the UE shall handle the 5GMM parameters 5GMM state, 5GS update status, 5G-GUTI, last visited registered TAI, TAI list and ngKSI as specified in 3GPP TS 24.501 [54] for the case when the registration procedure for mobility and periodic registration update performed over 3GPP access and indicating "mobility registration updating" in the 5GS registration type IE of the REGISTRATION REQUEST message is rejected with the 5GMM cause with the same value.

#10 (Implicitly detached);

If the EPS update type is "periodic updating", a UE in CS/PS mode 1 or CS/PS mode 2 of operation is IMSI detached for both EPS services and non-EPS services.

The UE shall enter the state EMM-DEREGISTERED.NORMAL-SERVICE. The UE shall delete any mapped EPS security context or partial native EPS security context. If the rejected request was not for initiating a PDN connection for emergency bearer services, the UE shall then perform a new attach procedure.

NOTE 5: User interaction is necessary in some cases when the UE cannot re-activate the EPS bearer(s) automatically.

If A/Gb mode or Iu mode is supported by the UE, the UE shall handle the GMM state as specified in 3GPP TS 24.008 [13] for the case when the normal routing area updating procedure is rejected with the GMM cause with the same value.

If the UE is operating in single-registration mode, the UE shall in addition handle the 5GMM state as specified in 3GPP TS 24.501 [54] for the case when the registration procedure for mobility and periodic registration update performed over 3GPP access and indicating "mobility registration updating" in the 5GS registration type IE of the REGISTRATION REQUEST message is rejected with the 5GMM cause with the same value.

#11 (PLMN not allowed); or

#35 (Requested service option not authorized in this PLMN);

The UE shall set the EPS update status to EU3 ROAMING NOT ALLOWED (and shall store it according to clause 5.1.3.3) and shall delete any GUTI, last visited registered TAI, TAI list and eKSI. The UE shall reset the tracking area updating attempt counter, delete the list of equivalent PLMNs and enter the state EMM-DEREGISTERED.PLMN-SEARCH.

The UE shall store the PLMN identity in the "forbidden PLMN list" and if the UE is configured to use timer T3245 (see 3GPP TS 24.368 [15A] or 3GPP TS 31.102 [17]) then the UE shall start timer T3245 and proceed as described in clause 5.3.7a. If the message has been successfully integrity checked by the NAS and the UE maintains a PLMN-specific attempt counter for that PLMN, then the UE shall set this counter to the UE implementation-specific maximum value.

The UE shall perform a PLMN selection according to 3GPP TS 23.122 [6].

If A/Gb mode or Iu mode is supported by the UE, the UE shall handle the GMM parameters GMM state, GPRS update status, P-TMSI, P-TMSI signature, RAI, GPRS ciphering key sequence number and routing area updating attempt counter and the MM parameters update status, TMSI, LAI, ciphering key sequence number and the location update attempt counter as specified in 3GPP TS 24.008 [13] for the case when the normal routing area updating procedure is rejected with the GMM cause value #11 and no RR connection exists.

For the EMM cause value #11, if the UE is operating in single-registration mode, the UE shall in addition handle the 5GMM parameters 5GMM state, 5GS update status, 5G-GUTI, last visited registered TAI, TAI list, ngKSI and registration attempt counter as specified in 3GPP TS 24.501 [54] for the case when the registration procedure for mobility and periodic registration update performed over 3GPP access and indicating "mobility registration updating" in the 5GS registration type IE of the REGISTRATION REQUEST message is rejected with the 5GMM cause with the same value.

For the EMM cause value #35, if the UE is operating in single-registration mode, the UE shall in addition set the 5GMM state to 5GMM-DEREGISTERED, 5GS update status to 5U3 ROAMING NOT ALLOWED, and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI. In addition, the UE shall reset the registration attempt counter.

#12 (Tracking area not allowed);

The UE shall set the EPS update status to EU3 ROAMING NOT ALLOWED (and shall store it according to clause 5.1.3.3) and shall delete any GUTI, last visited registered TAI, TAI list and eKSI. The UE shall reset the tracking area updating attempt counter and shall enter the state EMM-DEREGISTERED.LIMITED-SERVICE.

The UE shall store the current TAI in the list of "forbidden tracking areas for regional provision of service". If the TRACKING AREA UPDATE REJECT message is not integrity protected, the UE shall memorize the current TAI was stored in the list of "forbidden tracking areas for regional provision of service" for non-integrity protected NAS reject message.

If A/Gb mode or Iu mode is supported by the UE, the UE shall handle the GMM parameters GMM state, GPRS update status, P-TMSI, P-TMSI signature, RAI, GPRS ciphering key sequence number and routing area updating attempt counter as specified in 3GPP TS 24.008 [13] for the case when the normal routing area updating procedure is rejected with the GMM cause with the same value.

If the UE is operating in single-registration mode, the UE shall in addition handle the 5GMM parameters 5GMM state, 5GS update status, 5G-GUTI, last visited registered TAI, TAI list, ngKSI and registration attempt counter as specified in 3GPP TS 24.501 [54] for the case when the registration procedure for mobility and periodic registration update performed over 3GPP access and indicating "mobility registration updating" in the 5GS registration type IE of the REGISTRATION REQUEST message is rejected with the 5GMM cause with the same value.

#13 (Roaming not allowed in this tracking area);

The UE shall set the EPS update status to EU3 ROAMING NOT ALLOWED (and shall store it according to clause 5.1.3.3) and shall delete the list of equivalent PLMNs. The UE shall reset the tracking area updating attempt counter and shall change to state EMM-REGISTERED.PLMN-SEARCH.

The UE shall store the current TAI in the list of "forbidden tracking areas for roaming" and shall remove the current TAI from the stored TAI list if present. If the TRACKING AREA UPDATE REJECT message is not integrity protected, the UE shall memorize the current TAI was stored in the list of "forbidden tracking areas for roaming" for non-integrity protected NAS reject message.

If the UE is registered in N1 mode and operating in dual-registration mode, the PLMN that the UE chooses to register in is specified in 3GPP TS 24.501 [54] clause 4.8.3. Otherwise the UE shall perform a PLMN selection according to 3GPP TS 23.122 [6].

If A/Gb mode or Iu mode is supported by the UE, the UE shall handle the GMM parameters GMM state, GPRS update status and routing area updating attempt counter as specified in 3GPP TS 24.008 [13] for the case when the normal routing area updating procedure is rejected with the GMM cause with the same value.

If the UE is operating in single-registration mode, the UE shall in addition handle the 5GMM parameters 5GMM state, 5GS update status, and registration attempt counter as specified in 3GPP TS 24.501 [54] for the case when the registration procedure for mobility and periodic registration update performed over 3GPP access and indicating "mobility registration updating" in the 5GS registration type IE of the REGISTRATION REQUEST message is rejected with the 5GMM cause with the same value.

#14 (EPS services not allowed in this PLMN);

The UE shall set the EPS update status to EU3 ROAMING NOT ALLOWED (and shall store it according to clause 5.1.3.3). Furthermore, the UE shall delete any GUTI, last visited registered TAI, TAI list and eKSI. The UE shall reset the tracking area updating attempt counter and shall enter the state EMM-DEREGISTERED.PLMN-SEARCH.

The UE shall store the PLMN identity in the "forbidden PLMNs for GPRS service" list and if the UE is configured to use timer T3245 (see 3GPP TS 24.368 [15A] or 3GPP TS 31.102 [17]) then the UE shall start timer T3245 and proceed as described in clause 5.3.7a. If the message has been successfully integrity checked by the NAS and the UE maintains a PLMN-specific PS-attempt counter for that PLMN, then the UE shall set this counter to the UE implementation-specific maximum value.

If the EPS update type is "TA updating", or the EPS update type is "periodic updating" and the UE is in PS mode 1 or PS mode 2 of operation, the UE shall perform a PLMN selection according to 3GPP TS 23.122 [6]. In this case, the UE supporting S1 mode only shall delete the list of equivalent PLMNs before performing the procedure.

If the EPS update type is "periodic updating", a UE operating in CS/PS mode 1 or CS/PS mode 2 of operation, which is IMSI attached for non-EPS services, is still IMSI attached for non-EPS services and shall proceed as follows:

- a UE operating in CS/PS mode 1 or CS/PS mode 2 of operation shall set the update status to U2 NOT UPDATED;

- a UE operating in CS/PS mode 1 of operation and supporting A/Gb mode or Iu mode may select GERAN or UTRAN radio access technology and proceed with the appropriate MM specific procedure according to the MM service state. In this case, the UE shall disable the E-UTRA capability (see clause 4.5);

- a UE operating in CS/PS mode 1 of operation and supporting A/Gb mode or Iu mode may perform a PLMN selection according to 3GPP TS 23.122 [6];

- a UE operating in CS/PS mode 1 of operation and supporting S1 mode only, or operating in CS/PS mode 2 of operation shall delete the list of equivalent PLMNs and shall perform a PLMN selection according to 3GPP TS 23.122 [6].

If A/Gb mode or Iu mode is supported by the UE, the UE shall handle the GMM parameters GMM state, GPRS update status, P-TMSI, P-TMSI signature, RAI, GPRS ciphering key sequence number and routing area updating attempt counter as specified in 3GPP TS 24.008 [13] for the case when the normal routing area updating procedure is rejected with the GMM cause with the same value.

If the UE is operating in single-registration mode, the UE shall in addition set the 5GMM state to 5GMM-DEREGISTERED, 5GS update status to 5U3 ROAMING NOT ALLOWED, and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI. In addition, the UE shall reset the registration attempt counter.

#15 (No suitable cells in tracking area);

The UE shall set the EPS update status to EU3 ROAMING NOT ALLOWED (and shall store it according to clause 5.1.3.3). The UE shall reset the tracking area updating attempt counter and shall enter the state EMM-REGISTERED.LIMITED-SERVICE.

The UE shall store the current TAI in the list of "forbidden tracking areas for roaming". If the TRACKING AREA UPDATE REJECT message is not integrity protected, the UE shall memorize the current TAI was stored in the list of "forbidden tracking areas for roaming" for non-integrity protected NAS reject message. Additionally, the UE shall remove the current TAI from the stored TAI list if present and:

- if the UE is in WB-S1 mode and the Extended EMM cause IE with value "E-UTRAN not allowed" is included in the TRACKING AREA UPDATE REJECT message, the UE supports "E-UTRA Disabling for EMM cause #15", and the "E-UTRA Disabling Allowed for EMM cause #15" parameter as specified in 3GPP TS 24.368 [15A] or 3GPP TS 31.102 [17] is present and set to enabled; then the UE shall disable the E-UTRA capability as specified in clause 4.5 and search for a suitable cell in another location area or 5GS tracking area;

- if the UE is in NB-S1 mode and the Extended EMM cause IE with value "NB-IoT not allowed" is included in the TRACKING AREA UPDATE REJECT message, then the UE may disable the NB-IoT capability as specified in clause 4.9 and search for a suitable cell in E-UTRAN radio access technology;

- otherwise, the UE shall search for a suitable cell in another tracking area or in another location area according to 3GPP TS 36.304 [21].

If A/Gb mode or Iu mode is supported by the UE, the UE shall handle the GMM parameters GMM state, GPRS update status and routing area updating attempt counter as specified in 3GPP TS 24.008 [13] for the case when the normal routing area updating procedure is rejected with the GMM cause with the same value.

If the UE is operating in single-registration mode, the UE shall in addition handle the 5GMM parameters 5GMM state, 5GS update status, and registration attempt counter as specified in 3GPP TS 24.501 [54] for the case when the registration procedure for mobility and periodic registration update performed over 3GPP access and indicating "mobility registration updating" in the 5GS registration type IE of the REGISTRATION REQUEST message is rejected with the 5GMM cause with the same value.

#22 (Congestion);

If the T3346 value IE is present in the TRACKING AREA UPDATE REJECT message and the value indicates that this timer is neither zero nor deactivated, the UE shall proceed as described below, otherwise it shall be considered as an abnormal case and the behaviour of the UE for this case is specified in clause 5.5.3.2.6.

The UE shall abort the tracking area updating procedure, reset the tracking area updating attempt counter and set the EPS update status to EU2 NOT UPDATED. If the rejected request was not for initiating a PDN connection for emergency bearer services, the UE shall change to state EMM-REGISTERED.ATTEMPTING-TO-UPDATE.

The UE shall stop timer T3346 if it is running.

If the TRACKING AREA UPDATE REJECT message is integrity protected, the UE shall start timer with the value provided in the T3346 value IE.

If the TRACKING AREA UPDATE REJECT message is not integrity protected, the UE shall start timer T3346 with a random value from the default range specified in 3GPP TS 24.008 [13].

The UE stays in the current serving cell and applies the normal cell reselection process. The tracking area updating procedure is started, if still necessary, when timer T3346 expires or is stopped.

If A/Gb mode or Iu mode is supported by the UE, the UE shall handle the GMM parameters GMM state, GPRS update status and routing area updating attempt counter as specified in 3GPP TS 24.008 [13] for the case when the normal routing area updating procedure is rejected with the GMM cause with the same value.

If the tracking area updating procedure was initiated for and MO MMTEL voice or MO MMTEL video call is started, then a notification that the request was not accepted due to network congestion shall be provided to upper layers.

NOTE 6: This can result in the upper layers requesting establishment of the originating voice call on an alternative manner e.g. requesting establishment of a CS voice call (see 3GPP TS 24.173 [13E]).

If the UE is operating in single-registration mode, the UE shall in addition handle the 5GMM parameters 5GMM state, 5GS update status and registration attempt counter as specified in 3GPP TS 24.501 [54] for the case when the registration procedure for mobility and periodic registration update performed over 3GPP access and indicating "mobility registration updating" in the 5GS registration type IE of the REGISTRATION REQUEST message is rejected with the 5GMM cause with the same value.

#25 (Not authorized for this CSG);

EMM cause #25 is only applicable when received from a CSG cell. EMM cause #25 received from a non-CSG cell is considered as an abnormal case and the behaviour of the UE is specified in clause 5.5.3.2.6.

The UE shall set the EPS update status to EU3 ROAMING NOT ALLOWED (and store it according to clause 5.1.3.3). The UE shall reset the tracking area updating attempt counter and shall enter the state EMM-REGISTERED.LIMITED-SERVICE.

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, the UE shall remove the entry corresponding to this CSG ID and associated PLMN identity from the Allowed CSG list.

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 Operator CSG list, the UE shall apply the procedures defined in 3GPP TS 23.122 [6] clause 3.1A.

The UE shall search for a suitable cell according to 3GPP TS 36.304 [21].

If A/Gb mode or Iu mode is supported by the UE, the UE shall handle the GMM parameters GMM state, GPRS update status and routing area updating attempt counter as specified in 3GPP TS 24.008 [13] for the case when the normal routing area updating procedure is rejected with the GMM cause with the same value.

If the UE is operating in single-registration mode, the UE shall in addition set the 5GMM state to 5GMM-REGISTERED and set the 5GS update status to 5U3 ROAMING NOT ALLOWED and reset the registration attempt counter.

#31 (Redirection to 5GCN required);

EMM cause #31 received by a UE that has not indicated support for CIoT optimizations or not indicated support for N1 mode is considered as an abnormal case and the behaviour of the UE is specified in clause 5.5.3.2.6.

The UE shall set the EPS update status to EU3 ROAMING NOT ALLOWED (and shall store it according to clause 5.1.3.3). The UE shall reset the tracking area updating attempt counter and shall enter the state EMM-REGISTERED.LIMITED-SERVICE.

The UE shall enable N1 mode capability for 3GPP access if it was disabled and disable the E-UTRA capability (see clause 4.5).

If the UE is operating in single-registration mode, the UE shall in addition handle the 5GMM parameters 5GMM state, 5GS update status, and registration attempt counter as specified in 3GPP TS 24.501 [54] for the case when the registration procedure for mobility and periodic registration update performed over 3GPP access and indicating "mobility registration updating" in the 5GS registration type IE of the REGISTRATION REQUEST message is rejected with the 5GMM cause with the same value.

#40 (No EPS bearer context activated);

The UE shall deactivate all the EPS bearer contexts locally, if any, and shall enter the state EMM-DEREGISTERED.NORMAL-SERVICE. If the rejected request was not for initiating a PDN connection for emergency bearer services, the UE shall perform a new attach procedure.

NOTE 7: User interaction is necessary in some cases when the UE cannot re-activate the EPS bearer(s) automatically.

If A/Gb mode or Iu mode is supported by the UE, the UE shall handle the GMM state as specified in 3GPP TS 24.008 [13] for the case when the normal routing area updating procedure is rejected with the GMM cause value #10 "Implicitly detached".

If the UE is operating in single-registration mode, the UE shall in addition set the 5GMM state to 5GMM-DEREGISTERED.

#42 (Severe network failure);

The UE shall set the EPS update status to EU2 NOT UPDATED, and shall delete any GUTI, last visited registered TAI, TAI list, eKSI, and list of equivalent PLMNs, and set the tracking area update counter to 5. The UE shall start an implementation specific timer, setting its value to 2 times the value of T as defined in 3GPP TS 23.122 [6]. While this timer is running, the UE shall not consider the PLMN + RAT combination that provided this reject cause as a candidate for PLMN selection. The UE then enters state EMM-DEREGISTERED.PLMN-SEARCH in order to perform a PLMN selection according to 3GPP TS 23.122 [6].

If A/Gb mode or Iu mode is supported by the UE, the UE shall in addition set the GMM state to GMM-DEREGISTERED, GPRS update status to GU2 NOT UPDATED, and shall delete the P-TMSI, P-TMSI signature, RAI and GPRS ciphering key sequence number.

If the UE is operating in single-registration mode, the UE shall in addition set the 5GMM state to 5GMM-DEREGISTERED, 5GS update status to 5U2 NOT UPDATED, and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI.

#78 (PLMN not allowed to operate at the present UE location).

This cause value received from a non-satellite E-UTRA cell is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.3.2.6.

The UE shall set the EPS update status to EU3 ROAMING NOT ALLOWED (and shall store it according to clause 5.1.3.3) and shall delete any GUTI, last visited registered TAI, TAI list and eKSI. Additionally, the UE shall reset the registration attempt counter and shall enter state EMM-DEREGISTERED.PLMN-SEARCH and perform a PLMN selection according to 3GPP TS 23.122 [6].

Editor's note: [IoT\_SAT\_ARCH\_EPS, CR#3620]. It is FFS how to prevent the UE from making repeated attempts at selecting the same satellite access PLMN if there are no other available PLMNs at UE's location.

Other values are considered as abnormal cases. The specification of the UE behaviour in those cases is described in clause 5.5.3.2.6.

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

##### 5.5.3.2.6 Abnormal cases in the UE

The following abnormal cases can be identified:

a) Access barred because of access class barring, EAB, ACDC or NAS signalling connection establishment rejected by the network without "Extended wait time" received from lower layers

In WB-S1 mode, if the tracking area updating procedure is started in response to a paging request from the network, access class barring, EAB or ACDC is not applicable.

In NB-S1 mode, if the tracking area updating procedure is started in response to a paging request from the network, access barring is not applicable.

In WB-S1 mode, if access is barred for "originating signalling" (see 3GPP TS 36.331 [22]), the tracking area updating procedure shall not be started. The UE stays in the current serving cell and applies the normal cell reselection process. The tracking area updating procedure is started as soon as possible and if still necessary, e.g. when access for "originating signalling" is granted on the current cell or when the UE moves to a cell where access for "originating signalling" is granted.

In NB-S1 mode, if access is barred for "originating signalling" (see 3GPP TS 36.331 [22]), the tracking area updating procedure shall not be started. The UE stays in the current serving cell and applies the normal cell reselection process. Further UE behaviour is implementation specific, e.g. the tracking area updating procedure is started again after an implementation dependent time.

In NB-S1 mode, if access is barred for "originating signalling" (see 3GPP TS 36.331 [22]), a request for an exceptional event is received from the upper layers, then the tracking area updating procedure shall be started.

NOTE 1: In NB-S1 mode, the EMM layer cannot receive the access barring alleviation indication from the lower layers (see 3GPP TS 36.331 [22]).

If access is barred because of access class barring for "originating signalling" (see 3GPP TS 36.331 [22]) and if:

- one of the MO MMTEL voice call is started, MO MMTEL video call is started or MO SMSoIP is started conditions is satisfied;

- the upper layers request to send a mobile originated SMS over NAS or SMS over S102; or

- the upper layers request user plane radio resources, ACDC is applicable to the request and the UE supports ACDC.

then the tracking area updating procedure shall be started according to clause 5.5.3.2.2. The call type used shall be per annex D of this document.

NOTE 2: If more than one of MO MMTEL voice call is started, MO MMTEL video call is started or MO SMSoIP is started conditions are satisfied, it is left to UE implementation to determine the call type based on Annex D of this document.

If access is barred for a certain ACDC category (see 3GPP TS 36.331 [22]), and if the upper layers request user plane radio resources for a higher ACDC category and the UE supports ACDC, then the tracking area updating procedure shall be started according to clause 5.5.3.2.2.

If an access request for an uncategorized application is barred due to ACDC (see 3GPP TS 36.331 [22]), and if the upper layers request user plane radio resources for a certain ACDC category and the UE supports ACDC, then the tracking area updating procedure shall be started according to clause 5.5.3.2.2.

If the trigger for the tracking area updating procedure is the response to a paging request from the network and the NAS signalling connection establishment is rejected by the network, the tracking area updating procedure shall not be started. The UE stays in the current serving cell and applies normal cell reselection process. The tracking area updating procedure may be started if it is still necessary when access for "terminating calls" is granted or because of a cell change.

b) Lower layer failure or release of the NAS signalling connection without "Extended wait time" and without "Extended wait time CP data" received from lower layers before the TRACKING AREA UPDATE ACCEPT or TRACKING AREA UPDATE REJECT message is received

The tracking area updating procedure shall be aborted, and the UE shall proceed as described below.

c) T3430 timeout

The UE shall abort the procedure. The NAS signalling connection, if any, shall be released locally.

NOTE 3: The NAS signalling connection can also be released if the UE deems that the network has failed the authentication check as specified in clause 5.4.2.7.

The UE shall proceed as described below.

d) TRACKING AREA UPDATE REJECT, other causes than those treated in clause 5.5.3.2.5, and cases of EMM cause values #22, #25, #31 and #78, if considered as abnormal cases according to clause 5.5.3.2.5

If the tracking area updating request is not for initiating a PDN connection for emergency bearer services, upon reception of the EMM causes #95, #96, #97, #99 and #111 the UE should set the tracking area updating attempt counter to 5.

The UE shall proceed as described below.

e) Change of cell into a new tracking area

If a cell change into a new tracking area occurs before the tracking area updating procedure is completed, the tracking area updating procedure shall be aborted and re-initiated immediately. The UE shall set the EPS update status to EU2 NOT UPDATED.

The UE shall proceed as described below.

f) Tracking area updating and detach procedure collision

EPS detach containing detach type "re-attach required" or "re-attach not required":

If the UE receives a DETACH REQUEST message before the tracking area updating procedure has been completed, the tracking area updating procedure shall be aborted and the detach procedure shall be progressed. If the DETACH REQUEST message contains detach type "re-attach not required" and EMM cause #2 "IMSI unknown in HSS", the UE will follow the procedure as described below for the detach type "IMSI detach".

EPS detach containing detach type "IMSI detach":

If the UE receives a DETACH REQUEST message before the tracking area updating procedure has been completed, the DETACH REQUEST message shall be ignored and tracking area updating procedure shall be progressed.

The UE shall proceed as described below.

g) Tracking area updating and GUTI reallocation procedure collision

If the UE receives a GUTI REALLOCATION COMMAND message before the tracking area updating procedure has been completed, this message shall be ignored and the tracking area updating procedure shall be progressed.

h) Transmission failure of TRACKING AREA UPDATE REQUEST message indication from lower layers

The tracking area updating procedure shall be aborted and re-initiated immediately. The UE shall set the EPS update status to EU2 NOT UPDATED.

i) Transmission failure of TRACKING AREA UPDATE COMPLETE message indication with TAI change from lower layers

If the current TAI is not in the TAI list, the tracking area updating procedure shall be aborted and re-initiated immediately. The UE shall set the EPS update status to EU2 NOT UPDATED.

If the current TAI is still part of the TAI list, it is up to the UE implementation how to re-run the ongoing procedure.

j) Transmission failure of TRACKING AREA UPDATE COMPLETE message indication without TAI change from lower layers

It is up to the UE implementation how to re-run the ongoing procedure.

k) "Extended wait time" from the lower layers

If the TRACKING AREA UPDATE REQUEST message contained the low priority indicator set to "MS is configured for NAS signalling low priority", the UE shall start timer T3346 with the "Extended wait time" value and reset the tracking area updating attempt counter.

If the TRACKING AREA UPDATE REQUEST message did not contain the low priority indicator set to "MS is configured for NAS signalling low priority", the UE is operating in NB-S1 mode and the UE is not a UE configured to use AC11 – 15 in selected PLMN, then the UE shall start timer T3346 with the "Extended wait time" value and reset the tracking area updating attempt counter.

In other cases the UE shall ignore the "Extended wait time".

The UE shall abort the tracking area updating procedure, stay in the current serving cell, set the EPS update status to EU2 NOT UPDATED, change the state to EMM-REGISTERED.ATTEMPTING-TO-UPDATE and apply the normal cell reselection process.

If the UE had used eDRX before initiating tracking area updating procedure, then the UE shall continue to use the eDRX with the extended DRX parameters IE received during the last attach or tracking area updating procedure.

The UE shall proceed as described below.

ka) "Extended wait time CP data" from the lower layers

If the UE is operating in NB-S1 mode and supports the timer T3448, the UE shall start the timer T3448 with the "Extended wait time CP data" value. If the UE is operating in NB-S1 mode and does not support the timer T3448, the UE shall start the timer T3346 with the "Extended wait time CP data" value and reset the tracking area updating attempt counter.

In other cases the UE shall ignore the "Extended wait time CP data".

The UE shall abort the tracking area updating procedure, stay in the current serving cell, set the EPS update status to EU2 NOT UPDATED, change the state to EMM-REGISTERED.ATTEMPTING-TO-UPDATE and apply the normal cell reselection process.

If the UE had used eDRX before initiating tracking area updating procedure, then the UE shall continue to use the eDRX with the extended DRX parameters IE received during the last attach or tracking area updating procedure.

The UE shall proceed as described below.

l) Timer T3346 is running

The UE shall not start the tracking area updating procedure unless:

- the UE is in EMM-CONNECTED mode;

- the UE received a paging;

- the UE is a UE configured to use AC11 – 15 in selected PLMN;

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

- the UE is requested by the upper layer for a CS fallback for emergency call or a 1xCS fallback for emergency call;

- the UE in NB-S1 mode is requested by the upper layer to transmit user data related to an exceptional event and

i) the UE is allowed to use exception data reporting (see the ExceptionDataReportingAllowed leaf of the NAS configuration MO in 3GPP TS 24.368 [15A] or the USIM file EFNASCONFIG in 3GPP TS 31.102 [17]); and

ii) timer T3346 was not started when NAS signalling connection was established with RRC establishment cause set to "MO exception data"; or

- the UE has a PDN connection established without the NAS signalling low priority indication or is establishing a PDN connection without the NAS signalling low priority indication, the timer T3402 and the timer T3411 are not running and the timer T3346 was started due to rejection of a NAS request message (e.g. ATTACH REQUEST, TRACKING AREA UPDATE REQUEST or EXTENDED SERVICE REQUEST) which contained the low priority indicator set to "MS is configured for NAS signalling low priority".

The UE stays in the current serving cell and applies the normal cell reselection process.

NOTE 4: It is considered an abnormal case if the UE needs to initiate a tracking area updating procedure while timer T3346 is running independent on whether timer T3346 was started due to an abnormal case or a non successful case.

If the TAI of the current serving cell is not included in the TAI list or the TIN indicates "P-TMSI", the UE shall set the EPS update status to EU2 NOT UPDATED and change to state EMM-REGISTERED.ATTEMPTING-TO-UPDATE.

If the tracking area updating procedure needs to be initiated for an MO MMTEL voice call or an MO MMTEL video call is started, then a notification that the procedure was not initiated due to network congestion shall be provided to upper layers.

NOTE 5: This can result in the upper layers requesting establishment of the originating voice call on an alternative manner e.g. requesting establishment of a CS voice call (see 3GPP TS 24.173 [13E]).

The UE shall proceed as described below.

la) Timer T3448 is running

The UE shall not start the tracking area updating procedure with the "signalling active" flag set, unless:

- the UE is a UE configured to use AC11 – 15 in selected PLMN;

- the UE which is only using EPS services with control plane CIoT EPS optimization received a paging; or

- the UE in NB-S1 mode is requested by the upper layer to transmit user data related to an exceptional event and the UE is allowed to use exception data reporting (see the ExceptionDataReportingAllowed leaf of the NAS configuration MO in 3GPP TS 24.368 [15A] or the USIM file EFNASCONFIG in 3GPP TS 31.102 [17]).

The UE stays in the current serving cell and applies the normal cell reselection process.

The UE shall proceed as described below.

m) Mobile originated detach required

Detach due to removal of USIM or due to switch off:

The tracking area updating procedure shall be aborted, and the UE initiated detach procedure shall be performed.

Detach not due to removal of USIM and not due to switch off:

The UE initiated detach procedure shall be initiated after successful completion of the tracking area updating procedure.

o) Timer T3447 is running

The UE shall not start the tracking area updating procedure with the "signalling active" flag set or the "active" flag set, unless:

- the UE received a paging;

- the UE is a UE configured to use AC11 – 15 in selected PLMN;

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

The UE stays in the current serving cell and applies the normal cell reselection process. The tracking area update request procedure is started, if still necessary, when timer T3447 expires.

p) Tracking area updating and paging procedure collision

If the UE receives a CS SERVICE NOTIFICATION message before the tracking area updating procedure has been completed, the UE shall progress the tracking area updating procedure and respond to the CS SERVICE NOTIFICATION upon successful completion of the tracking area updating procedure.

For the cases b, c, d, e, f with detach type "re-attach required" or "re-attach not required" with EMM cause other than #2 "IMSI unknown in HSS", k and ka, the UE shall stop any ongoing transmission of user data.

For the cases b, c, d, k, ka, l and la, the UE shall proceed as follows:

Timer T3430 shall be stopped if still running.

For the cases b, c, d, la k when the "Extended wait time" is ignored, and ka when the "Extended wait time CP data" is ignored, if the tracking area updating request is not for initiating a PDN connection for emergency bearer services, the tracking area updating attempt counter shall be incremented, unless it was already set to 5.

If the tracking area updating attempt counter is less than 5, the TAI of the current serving cell is included in the TAI list, the EPS update status is equal to EU1 UPDATED, the TIN does not indicate "P-TMSI" and the tracking area updating procedure is performed not due to an inter-system change from N1 mode to S1 mode and the tracking area updating procedure is not performed due to cases g, m, n, za, zc in clause 5.5.3.2.2:

the UE shall keep the EPS update status to EU1 UPDATED and enter state EMM-REGISTERED.NORMAL-SERVICE. The UE shall start timer T3411.

If in addition the TRACKING AREA UPDATE REQUEST indicated "periodic updating" or if tracking area updating procedure was initiated to recover NAS signalling connection due to "RRC Connection failure" from the lower layers, none of the other reasons for initiating the tracking area updating procedure listed in clause 5.5.3.2.2 was applicable, and the TRACKING AREA UPDATE REQUEST message did not include T3324 value IE, T3412 extended value IE or Extended DRX parameters IE, the timer T3411 may be stopped when the UE enters EMM-CONNECTED mode.

If timer T3411 expires the tracking area updating procedure is triggered again.

If the tracking area updating attempt counter is less than 5, and the TAI of the current serving cell is not included in the TAI list or the EPS update status is different to EU1 UPDATED or the TIN indicates "P-TMSI" or the tracking area updating procedure is performed due to an inter-system change from N1 mode to S1 mode or if the tracking area updating procedure is performed due to cases g, m, n, za, zc in clause 5.5.3.2.2:

- for the cases k and l, the tracking area updating procedure is started, if still necessary, when timer T3346 expires or is stopped.

- for the case ka, if timer T3346 is started, the tracking area updating procedure is started, if still necessary, when timer T3346 expires or is stopped.

- for the case ka, if timer T3448 is started and the "signalling active" flag is set in the TRACKING AREA UPDATE REQUEST message, the tracking area updating procedure is started, if still necessary, when timer T3448 expires or is stopped.

- for the case la, if the "signalling active" flag is set in the TRACKING AREA UPDATE REQUEST message, the tracking area updating procedure is started, if still necessary, when timer T3448 expires or is stopped.

- for the cases b, c, d, k when the "Extended wait time" is ignored, and ka when the "Extended wait time CP data" is ignored, if the tracking area updating request is not for initiating a PDN connection for emergency bearer services, the UE shall start timer T3411, shall set the EPS update status to EU2 NOT UPDATED and change to state EMM-REGISTERED.ATTEMPTING-TO-UPDATE. When timer T3411 expires the tracking area updating procedure is triggered again.

If A/Gb mode or Iu mode is supported by the UE, the UE shall in addition handle the GPRS update status as specified in 3GPP TS 24.008 [13] for the abnormal case when a normal or periodic routing area updating procedure fails and the routing area updating attempt counter is less than 5 and the GPRS update status is different from GU1 UPDATED.

If the UE is operating in single-registration mode, the UE shall in addition handle the 5GS update status as specified in 3GPP TS 24.501 [54] for the abnormal cases when a registration procedure for mobility and periodic registration fails and the registration attempt counter is less than 5 and the 5GS update status is different from 5U1 UPDATED.

If the tracking area updating attempt counter is equal to 5:

- the UE shall start timer T3402, shall set the EPS update status to EU2 NOT UPDATED;

- the UE shall delete the list of equivalent PLMNs and shall change to state EMM-REGISTERED.ATTEMPTING-TO-UPDATE or optionally to EMM-REGISTERED.PLMN-SEARCH in order to perform a PLMN selection according to 3GPP TS 23.122 [6]; and

- if A/Gb mode, Iu mode or N1 mode is supported by the UE:

- if A/Gb mode or Iu mode is supported by the UE, the UE shall in addition handle the GPRS update status as specified in 3GPP TS 24.008 [13] for the abnormal case when a normal or periodic routing area updating procedure fails and the routing area updating attempt counter is equal to 5;

- if the UE is operating in single-registration mode, the UE shall in addition handle the 5GS update status as specified in 3GPP TS 24.501 [54] for the abnormal case when a registration procedure for mobility or periodic registration update performed over 3GPP access fails and the registration attempt counter is equal to 5; and

- if the UE does not change to state EMM-REGISTERED.PLMN-SEARCH, the UE shall

- attempt to select GERAN, UTRAN or NG-RAN radio access technology. Additionally, if the UE selects GERAN or UTRAN radio access technology, the UE may disable the E-UTRA capability as specified in clause 4.5. If No E-UTRA Disabling In 5GS is enabled at the UE (see 3GPP TS 24.368 [50]) and the UE selects NG-RAN radio access technology, it shall not disable the E-UTRA capability; otherwise, the UE may disable the E-UTRA capability as specified in clause 4.5.

NOTE 6: Whether the UE requests RRC to treat the active E-UTRA cell as barred (see 3GPP TS 36.304 [21]) is left to the UE implementation.

Editor's note: It is FFS whether a USIM file for the No E-UTRA Disabling In 5GS configuration is needed.

attempt to select GERAN. UTRAN or NG-RAN radio access technology.

If a GERAN or UTRAN cell is selected:

- a UE in PS mode 1 or PS mode 2 of operation shall proceed with appropriate GMM specific procedures;

- a UE in CS/PS mode 1 or CS/PS mode 2 of operation shall proceed with appropriate MM or GMM specific procedures.

If an NG-RAN cell is selected, the UE shall proceed with appropriate 5GMM specific procedures.

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

#### 5.6.1.5 Service request procedure not accepted by the network

If the service request cannot be accepted, the network shall return a SERVICE REJECT message to the UE including an appropriate EMM cause value.

NOTE 1: A service request can only be rejected before the network has initiated any procedure which will be interpreted by the UE as successful completion of the service request procedure (see clauses 5.6.1.4.1 and 5.6.1.4.2) and which will trigger a transition from state EMM-SERVICE-REQUEST-INITIATED to EMM-REGISTERED on the UE side.

Based on local policies or configurations in the MME, if the MME determines to change the periodic tracking area update timer (T3412), or if the MME determines to change the PSM usage or the value of timer T3324 in the UE for which PSM is allowed by the MME, the MME may return a SERVICE REJECT with the cause #10 "implicitly detached" to the UE.

Based on operator policy, if the service request procedure is rejected due to core network redirection for CIoT optimizations, the network shall set the EMM cause value to #31 "Redirection to 5GCN required".

NOTE 2: The network can take into account the UE's N1 mode capability, the 5GS CIoT network behaviour supported by the UE or the 5GS CIoT network behaviour supported by the 5GCN to determine the rejection with the EMM cause value #31 "Redirection to 5GCN required".

The MME may be configured to perform MME-based access control for mobile originating CS fallback calls for a certain area A by rejecting related service request with EMM cause #39 "CS service temporarily not available".

NOTE 3: Dependent on implementation and operator configuration the area A can be configured with the granularity of an MME area, tracking area or eNodeB service area.

The MME may further be configured for a certain area A' to exempt service requests for mobile originating CS fallback calls from this MME-based access control, if:

- the service request is initiated in EMM-IDLE mode; and

- the UE indicated support of eNodeB-based access control for mobile originating CS fallback calls during an attach or tracking area updating procedure.

NOTE 4: The operator can use this second option when the eNodeBs in area A' are supporting the eNodeB-based access control for CS fallback calls. The area A' can be part of area A or the whole area A. It is the responsibility of the operator to coordinate the activation of MME-based access control and eNodeB-based access control for mobile originating CS fallback calls.

When the EMM cause value is #39 "CS service temporarily not available", the MME shall include a value for timer T3442 in the SERVICE REJECT message. If a mobile terminating CS fallback call is aborted by the network during call establishment as specified in 3GPP TS 29.118 [16A], the MME shall include the EMM cause value #39 "CS service temporarily not available" and set the value of timer T3442 to zero.

If a service request from a UE with only LIPA PDN connections is not accepted due to the reasons specified in clause 5.6.1.4, depending on the service request received, the MME shall include the following EMM cause value in the SERVICE REJECT message:

- if the service request received is not due to CS fallback or 1xCS fallback, EMM cause value #10 "implicitly detached"; or

- if the service request received is due to CS fallback or 1xCS fallback, EMM cause value #40 "no EPS bearer context activated".

If a service request from a UE with only remaining SIPTO at the local network PDN connections is not accepted due to the reasons specified in clause 5.6.1.4, depending on the service request received, the MME shall:

- if the service request received is due to CS fallback or 1xCS fallback, include the EMM cause value #40 "no EPS bearer context activated" in the SERVICE REJECT message; or

- if the service request received is not due to CS fallback or 1xCS fallback, abort the service request procedure and send a DETACH REQUEST message to the UE with detach type "re-attach required" (see clause 5.5.2.3.1).

If the service request for mobile originated services is rejected due to general NAS level mobility management congestion control, the network shall set the EMM cause value to #22 "congestion" and assign a value for back-off timer T3346.

In NB-S1 mode, if the service request for mobile originated services is rejected due to operator determined barring (see 3GPP TS 29.272 [16C]), the network shall set the EMM cause value to #22 "congestion" and assign a value for back-off timer T3346.

If the service request for mobile originated services is rejected due to service gap control as specified in clause 5.3.17 i.e. the T3447 timer is running, the network shall set the EMM cause value to #22 "congestion" and may assign a back-off timer T3346 with the remaining time of the running T3447 timer.

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

- if the Release assistance indication IE is not 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 a 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 set the EMM cause value to #22 "congestion" and assign a value for control plane data back-off timer T3448.

If the service request is from a UE via a satellite E-UTRA cell and the network using the User Location Information provided by the eNodeB (see 3GPP TS 36.413 [23]), is able to determine that the UE is in a location where the network is not allowed to operate, the network shall set the EMM cause value in the SERVICE REJECT message to #78 "PLMN not allowed to operate at the present UE location" and may include an information element in the SERVICE REJECT message to indicate the country of the UE location.

Editor's note: [IoT\_SAT\_ARCH\_EPS, CR#3620]. The name and the encoding of the information element providing the country of the UE location is FFS.

Editor's note [IoT\_SAT\_ARCH\_EPS, CR#3620]: It is FFS if and how the HPLMN can influence the validity and use of the indication of country of UE location in the UE.

On receipt of the SERVICE REJECT message, if the UE is in state EMM-SERVICE-REQUEST-INITIATED and the message is integrity protected or contains a reject cause other than EMM cause value #25, the UE shall reset the service request attempt counter, stop timer T3417, T3417ext or T3417ext-mt, if running.

If the SERVICE REJECT message with EMM cause #25 was received without integrity protection, then the UE shall discard the message.

The UE shall take the following actions depending on the received EMM cause value in the SERVICE REJECT message.

#3 (Illegal UE);

#6 (Illegal ME); or

#8 (EPS services and non-EPS services not allowed);

The UE shall set the EPS update status to EU3 ROAMING NOT ALLOWED (and shall store it according to clause 5.1.3.3) and shall delete any GUTI, last visited registered TAI, TAI list and eKSI. The UE shall consider the USIM as invalid for EPS services until switching off or the UICC containing the USIM is removed or the timer T3245 expires as described in clause 5.3.7a. Additionally, the UE shall delete the list of equivalent PLMNs and shall enter the state EMM-DEREGISTERED.NO-IMSI. If the message has been successfully integrity checked by the NAS and the UE maintains a counter for "SIM/USIM considered invalid for GPRS services", then the UE shall set this counter to UE implementation-specific maximum value.

If A/Gb mode or Iu mode is supported by the UE, the UE shall handle the GMM parameters GMM state, GPRS update status, P-TMSI, P-TMSI signature, RAI and GPRS ciphering key sequence number and the MM parameters update status, TMSI, LAI and ciphering key sequence number as specified in 3GPP TS 24.008 [13] for the case when the service request procedure is rejected with the GMM cause with the same value. The USIM shall be considered as invalid also for non-EPS services until switching off or the UICC containing the USIM is removed or the timer T3245 expires as described in clause 5.3.7a. If the message has been successfully integrity checked by the NAS and the UE maintains a counter for "SIM/USIM considered invalid for non-GPRS services", then the UE shall set this counter to UE implementation-specific maximum value.

NOTE 5: The possibility to configure a UE so that the radio transceiver for a specific radio access technology is not active, although it is implemented in the UE, is out of scope of the present specification.

For the EMM cause value #3 or #6, if the UE is operating in single-registration mode, the UE shall handle the 5GMM parameters 5GMM state, 5GS update status, 5G-GUTI, last visited registered TAI, TAI list and ngKSI as specified in 3GPP TS 24.501 [54] for the case when the service request procedure performed over 3GPP access is rejected with the 5GMM cause with the same value.

For the EMM cause value #8, if the UE is operating in single-registration mode, the UE shall in addition set the 5GMM state to 5GMM-DEREGISTERED, 5GS update status to 5U3 ROAMING NOT ALLOWED, and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI.

#7 (EPS services not allowed);

The UE shall set the EPS update status to EU3 ROAMING NOT ALLOWED (and shall store it according to clause 5.1.3.3) and shall delete any GUTI, last visited registered TAI, TAI list and eKSI. The UE shall consider the USIM as invalid for EPS services until switching off or the UICC containing the USIM is removed or the timer T3245 expires as described in clause 5.3.7a. The UE shall enter the state EMM-DEREGISTERED. If the message has been successfully integrity checked by the NAS and the UE maintains a counter for "SIM/USIM considered invalid for GPRS services", then the UE shall set this counter to UE implementation-specific maximum value.

A UE operating in CS/PS mode 1 or CS/PS mode 2 of operation which is already IMSI attached for non-EPS services is still IMSI attached for non-EPS services.

A UE operating in CS/PS mode 1 or CS/PS mode 2 of operation shall set the update status to U2 NOT UPDATED, shall attempt to select GERAN or UTRAN radio access technology and proceed with appropriate MM specific procedure according to the MM service state. The UE shall not reselect E-UTRAN radio access technology until switching off or the UICC containing the USIM is removed.

If A/Gb mode or Iu mode is supported by the UE, the UE shall handle the GMM parameters GMM state, GPRS update status, P-TMSI, P-TMSI signature, RAI and GPRS ciphering key sequence number as specified in 3GPP TS 24.008 [13] for the case when the service request procedure is rejected with the GMM cause with the same value.

If the UE is operating in single-registration mode, the UE shall handle the 5GMM parameters 5GMM state, 5GS update status, 5G-GUTI, last visited registered TAI, TAI list and ngKSI as specified in 3GPP TS 24.501 [54] for the case when the service request procedure performed over 3GPP access is rejected with the 5GMM cause with the same value.

#9 (UE identity cannot be derived by the network);

The UE shall set the EPS update status to EU2 NOT UPDATED (and shall store it according to clause 5.1.3.3) and shall delete any GUTI, last visited registered TAI, TAI list and eKSI. The UE shall enter the state EMM-DEREGISTERED.NORMAL-SERVICE.

If the service request was initiated for CS fallback and a CS fallback cancellation request was not received, the UE shall attempt to select GERAN or UTRAN radio access technology. If the UE finds a suitable GERAN or UTRAN cell, it then proceeds with the appropriate MM and CC specific procedures and the EMM sublayer shall not indicate the abort of the service request procedure to the MM sublayer. Otherwise the EMM sublayer shall indicate the abort of the service request procedure to the MM sublayer.

If the service request was initiated for 1xCS fallback, the UE shall select cdma2000® 1x radio access technology. The UE then proceeds with appropriate cdma2000® 1x CS procedures.

If the service request was initiated for 1xCS fallback and the UE has dual Rx/Tx configuration and supports enhanced 1xCS fallback, the UE shall perform a new attach procedure.

If the service request was initiated for any reason other than CS fallback, 1x CS fallback or initiating a PDN connection for emergency bearer services, the UE shall perform a new attach procedure.

NOTE 6: User interaction is necessary in some cases when the UE cannot re-activate the EPS bearer(s) automatically.

If A/Gb mode or Iu mode is supported by the UE, the UE shall handle the GMM parameters GMM state, GPRS update status, P-TMSI, P-TMSI signature, RAI and GPRS ciphering key sequence number as specified in 3GPP TS 24.008 [13] for the case when the service request procedure is rejected with the GMM cause with the same value.

A UE operating in CS/PS mode 1 or CS/PS mode 2 of operation which is already IMSI attached for non-EPS services is still IMSI attached for non-EPS services.

A UE operating in CS/PS mode 1 or CS/PS mode 2 of operation shall set the update status to U2 NOT UPDATED.

If the UE is operating in single-registration mode, the UE shall handle the 5GMM parameters 5GMM state, 5GS update status, 5G-GUTI, last visited registered TAI, TAI list and ngKSI as specified in 3GPP TS 24.501 [54] for the case when the service request procedure performed over 3GPP access is rejected with the 5GMM cause with the same value.

#10 (Implicitly detached);

A UE in CS/PS mode 1 or CS/PS mode 2 of operation is IMSI detached for both EPS services and non-EPS services.

The UE shall enter the state EMM-DEREGISTERED.NORMAL-SERVICE. The UE shall delete any mapped EPS security context or partial native EPS security context.

If the service request was initiated for CS fallback and a CS fallback cancellation request was not received, the UE shall attempt to select GERAN or UTRAN radio access technology. If the UE finds a suitable GERAN or UTRAN cell, it then proceeds with the appropriate MM and CC specific procedures and the EMM sublayer shall not indicate the abort of the service request procedure to the MM sublayer. Otherwise the EMM sublayer shall indicate the abort of the service request procedure to the MM sublayer.

If the service request was initiated for 1xCS fallback, the UE shall select cdma2000® 1x radio access technology. The UE then proceeds with appropriate cdma2000® 1x CS procedures.

If the service request was initiated for 1xCS fallback and the UE has dual Rx/Tx configuration and supports enhanced 1xCS fallback, the UE shall perform a new attach procedure.

If the service request was initiated for any reason other than CS fallback, 1x CS fallback or initiating a PDN connection for emergency bearer services, the UE shall perform a new attach procedure.

NOTE 7: User interaction is necessary in some cases when the UE cannot re-activate the EPS bearer(s) automatically.

If A/Gb mode or Iu mode is supported by the UE, the UE shall handle the GMM state as specified in 3GPP TS 24.008 [13] for the case when the service request procedure is rejected with the GMM cause with the same value.

A UE operating in CS/PS mode 1 or CS/PS mode 2 of operation shall set the update status to U2 NOT UPDATED.

If the UE is operating in single-registration mode, the UE shall in addition handle the 5GMM state as specified in 3GPP TS 24.501 [54] for the case when the service request procedure performed over 3GPP access is rejected with the 5GMM cause with the same value.

#11 (PLMN not allowed); or

#35 (Requested service option not authorized in this PLMN);

The UE shall set the EPS update status to EU3 ROAMING NOT ALLOWED (and shall store it according to clause 5.1.3.3) and shall delete any GUTI, last visited registered TAI, TAI list and eKSI. The UE shall delete the list of equivalent PLMNs and shall enter the state EMM-DEREGISTERED.PLMN-SEARCH.

The UE shall store the PLMN identity in the "forbidden PLMN list" and if the UE is configured to use timer T3245 (see 3GPP TS 24.368 [15A] or 3GPP TS 31.102 [17]) then the UE shall start timer T3245 and proceed as described in clause 5.3.7a. If the message has been successfully integrity checked by the NAS and the UE maintains a PLMN-specific attempt counter for that PLMN, then the UE shall set this counter to the UE implementation-specific maximum value.

The UE shall perform a PLMN selection according to 3GPP TS 23.122 [6].

If A/Gb mode or Iu mode is supported by the UE, the UE shall handle the GMM parameters GMM state, GPRS update status, P-TMSI, P-TMSI signature, RAI and GPRS ciphering key sequence number and the MM parameters update status, TMSI, LAI, ciphering key sequence number and the location update attempt counter as specified in 3GPP TS 24.008 [13] for the case when the service request procedure is rejected with the GMM cause value #11.

For the EMM cause value #11, if the UE is operating in single-registration mode, the UE shall in addition handle the 5GMM parameters 5GMM state, 5GS update status, 5G-GUTI, last visited registered TAI, TAI list and ngKSI as specified in 3GPP TS 24.501 [54] for the case when the service request procedure performed over 3GPP access is rejected with the 5GMM cause with the same value.

For the EMM cause value #35, if the UE is operating in single-registration mode, the UE shall in addition set the 5GMM state to 5GMM-DEREGISTERED, 5GS update status to 5U3 ROAMING NOT ALLOWED, and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI.

#12 (Tracking area not allowed);

The UE shall set the EPS update status to EU3 ROAMING NOT ALLOWED (and shall store it according to clause 5.1.3.3) and shall delete any GUTI, last visited registered TAI, TAI list and eKSI. The UE shall enter the state EMM-DEREGISTERED.LIMITED-SERVICE.

The UE shall store the current TAI in the list of "forbidden tracking areas for regional provision of service". If the SERVICE REJECT message is not integrity protected, the UE shall memorize the current TAI was stored in the list of "forbidden tracking areas for regional provision of service" for non-integrity protected NAS reject message.

If the UE initiated service request for mobile originated CS fallback and a CS fallback cancellation request was not received, then the UE shall attempt to select GERAN or UTRAN radio access technology. If the UE finds a suitable GERAN or UTRAN cell, it then proceeds with the appropriate MM and CC specific procedures and the EMM sublayer shall not indicate the abort of the service request procedure to the MM sublayer. Otherwise the EMM sublayer shall indicate the abort of the service request procedure to the MM sublayer.

If A/Gb mode or Iu mode is supported by the UE, the UE shall handle the GMM parameters GMM state, GPRS update status, P-TMSI, P-TMSI signature, RAI and GPRS ciphering key sequence number as specified in 3GPP TS 24.008 [13] for the case when the service request procedure is rejected with the GMM cause with the same value.

If the UE is operating in single-registration mode, the UE shall in addition handle the MM parameters update status, TMSI, LAI, ciphering key sequence number and the location update attempt counter, and the 5GMM parameters 5GMM state, 5GS update status, 5G-GUTI, last visited registered TAI, TAI list and ngKSI as specified in 3GPP TS 24.501 [54] for the case when the service request procedure performed over 3GPP access is rejected with the 5GMM cause with the same value.

#13 (Roaming not allowed in this tracking area);

The UE shall set the EPS update status to EU3 ROAMING NOT ALLOWED (and shall store it according to clause 5.1.3.3). The UE shall enter the state EMM-REGISTERED.PLMN-SEARCH.

The UE shall store the current TAI in the list of "forbidden tracking areas for roaming" and remove the current TAI from the stored TAI list if present. If the SERVICE REJECT message is not integrity protected, the UE shall memorize the current TAI was stored in the list of "forbidden tracking areas for roaming" for non-integrity protected NAS reject message.

The UE shall perform a PLMN selection according to 3GPP TS 23.122 [6].

If A/Gb mode or Iu mode is supported by the UE, the UE shall handle the MM parameters update status, TMSI, LAI, ciphering key sequence number and the location update attempt counter, and the GMM parameters GMM state and GPRS update status as specified in 3GPP TS 24.008 [13] for the case when the service request procedure is rejected with the GMM cause with the same value.

If the UE is operating in single-registration mode, the UE shall in addition handle the 5GMM parameters 5GMM state, 5GS update status, 5G-GUTI, last visited registered TAI, TAI list and ngKSI as specified in 3GPP TS 24.501 [54] for the case when the service request procedure performed over 3GPP access is rejected with the 5GMM cause with the same value.

#15 (No suitable cells in tracking area);

The UE shall enter the state EMM-REGISTERED.LIMITED-SERVICE.

The UE shall store the current TAI in the list of "forbidden tracking areas for roaming" and remove the current TAI from the stored TAI list if present. If the SERVICE REJECT message is not integrity protected, the UE shall memorize the current TAI was stored in the list of "forbidden tracking areas for roaming" for non-integrity protected NAS reject message.

If the UE initiated service request for mobile originated CS fallback and a CS fallback cancellation request was not received, then the UE shall attempt to select GERAN or UTRAN radio access technology. If the UE finds a suitable GERAN or UTRAN cell, it then proceeds with the appropriate MM and CC specific procedures and the EMM sublayer shall not indicate the abort of the service request procedure to the MM sublayer. Otherwise the EMM sublayer shall indicate the abort of the service request procedure to the MM sublayer.

If the service request was not initiated for mobile originated CS fallback, the UE shall search for a suitable cell in another tracking area or in another location area according to 3GPP TS 36.304 [21].

If A/Gb mode or Iu mode is supported by the UE, the UE shall handle the MM parameters update status, TMSI, LAI, ciphering key sequence number and the location update attempt counter, and the GMM parameters GMM state and GPRS update status as specified in 3GPP TS 24.008 [13] for the case when the service request procedure is rejected with the GMM cause with the same value.

If the UE is operating in single-registration mode, the UE shall in addition handle the 5GMM parameters 5GMM state, 5GS update status, 5G-GUTI, last visited registered TAI, TAI list and ngKSI as specified in 3GPP TS 24.501 [54] for the case when the service request procedure performed over 3GPP access is rejected with the 5GMM cause with the same value.

#18 (CS domain not available);

If the request was related to CS fallback, the UE shall send an indication to the MM sublayer and shall not attempt CS fallback until combined tracking area updating procedure has been successfully completed. The UE shall enter the state EMM-REGISTERED.NORMAL-SERVICE.

The UE shall set the update status to U2 NOT UPDATED.

If the UE is in CS/PS mode 1 of operation with "IMS voice not available" and the request was related to CS fallback, the UE shall attempt to select GERAN or UTRAN radio access technology and disable the E-UTRA capability (see clause 4.5).

If the UE is in CS/PS mode 1 or CS/PS mode 2 mode of operation, the UE may provide a notification to the user or the upper layers that the CS domain is not available.

If the request was related to 1xCS fallback, the UE shall cancel upper layer actions related to 1xCS fallback and enter the state EMM-REGISTERED.NORMAL-SERVICE.

#22 (Congestion);

If the T3346 value IE is present in the SERVICE REJECT message and the value indicates that this timer is neither zero nor deactivated, the UE shall proceed as described below, otherwise it shall be considered as an abnormal case and the behaviour of the UE for this case is specified in clause 5.6.1.6.

If the rejected request was not for initiating a PDN connection for emergency bearer services, the UE shall abort the service request procedure and enter state EMM-REGISTERED, and stop timer T3417, T3417ext or T3417ext-mt if still running.

The UE shall stop timer T3346 if it is running.

If the SERVICE REJECT message is integrity protected, the UE shall start timer T3346 with the value provided in the T3346 value IE.

If the SERVICE REJECT message is not integrity protected, the UE shall start timer T3346 with a random value from the default range specified in 3GPP TS 24.008 [13].

If the service request was initiated for CS fallback and a CS fallback cancellation request was not received, the UE in CS/PS mode 1 of operation shall attempt to select GERAN or UTRAN radio access technology. If the UE finds a suitable GERAN or UTRAN cell, it then proceeds with the appropriate MM and CC specific procedures and the EMM sublayer shall not indicate the abort of the service request procedure to the MM sublayer. Otherwise the EMM sublayer shall indicate the abort of the service request procedure to the MM sublayer.

NOTE 8: If the UE disables the E-UTRA capability, then subsequent mobile terminating calls could fail.

If the service request was initiated for CS fallback for emergency call and a CS fallback cancellation request was not received, the UE may attempt to select GERAN or UTRAN radio access technology. It then proceeds with appropriate MM and CC specific procedures. The EMM sublayer shall not indicate the abort of the service request procedure to the MM sublayer.

If the service request was initiated for 1xCS fallback, the UE shall select cdma2000® 1x radio access technology. The UE then proceeds with appropriate cdma2000® 1x CS procedures.

If the service request was initiated for 1xCS fallback for emergency call, the UE may select cdma2000® 1x radio access technology. The UE then proceeds with appropriate cdma2000® 1x CS procedures.

If the service request was initiated in EMM-CONNECTED mode with Control plane service type "mobile originating request" and with the "active" flag set to 1, the UE shall abort the procedure.

If the service request procedure was initiated for an MO MMTEL voice call or an MO MMTEL video call is started, a notification that the service request was not accepted due to congestion shall be provided to the upper layers.

NOTE 9: This can result in the upper layers requesting establishment of the originating voice call on an alternative manner e.g. requesting establishment of a CS voice call (see 3GPP TS 24.173 [13E]).

For all other cases the UE stays in the current serving cell and applies normal cell reselection process. The service request procedure is started, if still necessary, when timer T3346 expires or is stopped.

If A/Gb mode or Iu mode is supported by the UE, the UE shall handle the GMM parameters GMM state and GPRS update status as specified in 3GPP TS 24.008 [13] for the case when the service request procedure is rejected with the GMM cause with the same value.

If the UE is using EPS services with control plane CIoT EPS optimization and if the T3448 value IE is present in the SERVICE REJECT message and the value indicates that this timer is neither zero nor deactivated, the UE shall:

- stop timer T3448 if it is running;

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

- start timer T3448:

- with the value provided in the T3448 value IE if the SERVICE REJECT message is integrity protected; or

- with a random value from the default range specified in table 10.2.1 if the SERVICE REJECT message is not integrity protected.

If the UE is using EPS services with control plane CIoT EPS optimization and if the T3448 value IE is present in the SERVICE REJECT message and the value indicates that this timer is either zero or deactivated, the UE shall ignore the T3448 value IE and- stop timer T3448 if it is running; and

- consider the transport of user data via the control plane as unsuccessful.

If the UE is using EPS services with control plane CIoT EPS optimization and if the T3448 value IE is not present in the SERVICE REJECT message, it shall be considered as an abnormal case and the behaviour of UE for this case is specified in clause 5.6.1.6.

If the UE is operating in single-registration mode, the UE shall in addition handle the 5GMM parameters, 5GMM state and 5GS update status as specified in 3GPP TS 24.501 [54] for the case when the service request procedure performed over 3GPP access is rejected with the 5GMM cause with the same value.

#25 (Not authorized for this CSG);

EMM cause #25 is only applicable when received from a CSG cell. EMM cause #25 received from a non-CSG cell is considered as an abnormal case and the behaviour of the UE is specified in clause 5.6.1.6.

The UE shall set the EPS update status to EU3 ROAMING NOT ALLOWED (and store it according to clause 5.1.3.3). The UE shall enter the state EMM-REGISTERED.LIMITED-SERVICE.

If the CSG ID and associated PLMN identity of the cell where the UE has initiated the service request procedure are contained in the Allowed CSG list, the UE shall remove the entry corresponding to this CSG ID and associated PLMN identity from the Allowed CSG list.

If the CSG ID and associated PLMN identity of the cell where the UE has initiated the service request procedure are contained in the Operator CSG list, the UE shall apply the procedures defined in 3GPP TS 23.122 [6] clause 3.1A.

The UE shall search for a suitable cell according to 3GPP TS 36.304 [21].

If A/Gb mode or Iu mode is supported by the UE, the UE shall handle the GMM parameters GMM state and GPRS update status as specified in 3GPP TS 24.008 [13] for the case when the service request procedure is rejected with the GMM cause with the same value.

If the UE is operating in single-registration mode, the UE shall in addition set the 5GMM state to 5GMM-REGISTERED and set the 5GS update status to 5U3 ROAMING NOT ALLOWED.

#31 (Redirection to 5GCN required);

EMM cause #31 received by a UE that has not indicated support for CIoT optimizations is considered as an abnormal case and the behaviour of the UE is specified in clause 5.6.1.6.

The UE shall set the EPS update status to EU3 ROAMING NOT ALLOWED (and shall store it according to clause 5.1.3.3). The UE shall reset the service request attempt counter and shall enter the state EMM-REGISTERED.LIMITED-SERVICE.

The UE shall enable N1 mode capability for 3GPP access if it was disabled and disable the E-UTRA capability (see clause 4.5).

If the UE is operating in single-registration mode, the UE shall in addition handle the 5GMM parameters, 5GMM state, and 5GS update status as specified in 3GPP TS 24.501 [54] for the case when the service request procedure performed over 3GPP access is rejected with the 5GMM cause with the same value.

#39 (CS service temporarily not available);

If the T3442 value received in the SERVICE REJECT message is not zero, the UE shall start timer T3442 and enter the state EMM-REGISTERED.NORMAL-SERVICE. If the T3442 value received in the SERVICE REJECT message is zero, the UE shall not start timer T3442.

The UE shall not try to send an EXTENDED SERVICE REQUEST message for mobile originating CS fallback to the network, except for mobile originating CS fallback for emergency calls, until timer T3442 expires or the UE sends a TRACKING AREA UPDATE REQUEST message.

#40 (No EPS bearer context activated);

The UE shall enter the state EMM-DEREGISTERED.NORMAL-SERVICE. The UE shall delete any mapped EPS security context or partial native EPS security context.

If the service request was initiated for CS fallback and a CS fallback cancellation request was not received, the UE shall attempt to select GERAN or UTRAN radio access technology. If the UE finds a suitable GERAN or UTRAN cell, it then proceeds with the appropriate MM and CC specific procedures and the EMM sublayer shall not indicate the abort of the service request procedure to the MM sublayer. Otherwise the EMM sublayer shall indicate the abort of the service request procedure to the MM sublayer.

If the service request was initiated for 1xCS fallback, the UE shall select cdma2000® 1x radio access technology. The UE then proceeds with appropriate cdma2000® 1x CS procedures.

If the service request was initiated for 1xCS fallback and the UE has dual Rx/Tx configuration and supports enhanced 1xCS fallback, the UE shall perform a new attach procedure.

If the service request was initiated for any reason other than CS fallback, 1x CS fallback or initiating a PDN connection for emergency bearer services, the UE shall perform a new attach procedure.

NOTE 10: User interaction is necessary in some cases when the UE cannot re-activate the EPS bearer(s) automatically.

If A/Gb mode or Iu mode is supported by the UE, the UE shall handle the GMM state as specified in 3GPP TS 24.008 [13] for the case when the service request procedure is rejected with the GMM cause value #10 "Implicitly detached".

A UE operating in CS/PS mode 1 or CS/PS mode 2 of operation which is already IMSI attached for non-EPS services is still IMSI attached for non-EPS services in the network.

A UE operating in CS/PS mode 1 or CS/PS mode 2 of operation shall set the update status to U2 NOT UPDATED.

If the UE is operating in single-registration mode, the UE shall in addition set the 5GMM state to 5GMM-DEREGISTERED.

#42 (Severe network failure);

The UE shall set the EPS update status to EU2 NOT UPDATED, and shall delete any GUTI, last visited registered TAI, TAI list, eKSI, and list of equivalent PLMNs. The UE shall start an implementation specific timer, setting its value to 2 times the value of T as defined in 3GPP TS 23.122 [6]. While this timer is running, the UE shall not consider the PLMN + RAT combination that provided this reject cause as a candidate for PLMN selection. The UE then enters state EMM-DEREGISTERED.PLMN-SEARCH in order to perform a PLMN selection according to 3GPP TS 23.122 [6].

If A/Gb mode or Iu mode is supported by the UE, the UE shall in addition set the GMM state to GMM-DEREGISTERED, GPRS update status to GU2 NOT UPDATED, MM update status to U2 NOT UPDATED and shall delete the P-TMSI, P-TMSI signature, RAI and GPRS ciphering key sequence number, LAI, TMSI and ciphering key sequence number.

If the UE is operating in single-registration mode, the UE shall in addition set the 5GMM state to 5GMM-DEREGISTERED, 5GS update status to 5U2 NOT UPDATED, and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI.

#78 (PLMN not allowed to operate at the present UE location).

This cause value received from a non-satellite E-UTRA cell is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.6.1.6.

The UE shall set the EPS update status to EU3 ROAMING NOT ALLOWED (and shall store it according to clause 5.1.3.3) and shall delete any GUTI, last visited registered TAI, TAI list and eKSI. Additionally, the UE shall reset the registration attempt counter and shall enter state EMM-DEREGISTERED.PLMN-SEARCH and perform a PLMN selection according to 3GPP TS 23.122 [6].

Editor's note: [IoT\_SAT\_ARCH\_EPS, CR#3620]. It is FFS how to prevent the UE from making repeated attempts at selecting the same satellite access PLMN if there are no other available PLMNs at UE's location.

Other values are considered as abnormal cases. The specification of the UE behaviour in those cases is described in clause 5.6.1.6.

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

#### 5.6.1.6 Abnormal cases in the UE

The following abnormal cases can be identified:

a) Access barred because of access class barring, EAB, ACDC or NAS signalling connection establishment rejected by the network without "Extended wait time" received from lower layers

In WB-S1 mode, if the service request procedure is started in response to a paging request from the network, access class barring, EAB or ACDC is not applicable.

In NB-S1 mode, if the service request procedure is started in response to a paging request from the network, access barring is not applicable.

If the trigger for the service request procedure is the response to a paging request from the network and the NAS signalling connection establishment is rejected by the network, the service request procedure shall not be started. The UE stays in the current serving cell and applies normal cell reselection process. During an implementation dependent time period, the service request procedure may be started when access for "terminating calls" is granted or upon a cell change.

If the service request was initiated for CS fallback and the access is barred for "mobile originating CS fallback" (see 3GPP TS 36.331 [22]) and the lower layer indicates "the barring is due to CSFB specific access barring information", the service request procedure shall not be started. The UE stays in the current serving cell and applies normal cell reselection process. The service request procedure may be started if it is still necessary, i.e. when access for "mobile originating CS fallback" is granted or because of a cell change.

If the service request was initiated for CS fallback and a CS fallback cancellation request was not received and the access is barred for "mobile originating CS fallback" (see 3GPP TS 36.331 [22]) and the lower layer does not indicate "the barring is due to CSFB specific access barring information", the UE shall attempt to select GERAN or UTRAN radio access technology. If the UE finds a suitable GERAN or UTRAN cell, it then proceeds with the appropriate MM and CC specific procedures and the EMM sublayer shall not indicate the abort of the service request procedure to the MM sublayer. Otherwise the EMM sublayer shall indicate the abort of the service request procedure to the MM sublayer.

If the service request was initiated for 1xCS fallback and the access is barred for "originating calls" (see 3GPP TS 36.331 [22]), the UE shall select cdma2000® 1x radio access technology. The UE then proceeds with appropriate cdma2000® 1x CS procedures.

If the lower layer indicated the access was barred because of access class barring for "originating calls" (see 3GPP TS 36.331 [22]) and if:

- the service request is initiated due to a request from upper layers for user plane radio resources, and the MO MMTEL voice call is started, the MO MMTEL video call is started or the MO SMSoIP is started;

- the service request is initiated due to a mobile originated SMS over NAS or SMS over S102; or

- the service request is initiated due to a request from upper layers for user plane radio resources, ACDC is applicable to the request and the UE supports ACDC.

then the service request procedure shall be started. The call type used shall be per annex D of this document.

NOTE 1: If more than one of MO MMTEL voice call is started, MO MMTEL video call is started or MO SMSoIP is started conditions are satisfied, it is left to UE implementation to determine the call type based on annex D of this document.

If access is barred for a certain ACDC category (see 3GPP TS 36.331 [22]), and if the upper layers request user plane radio resources for a higher ACDC category and the UE supports ACDC, then the service request procedure shall be started.

If an access request for an uncategorized application is barred due to ACDC (see 3GPP TS 36.331 [22]), and if the upper layers request user plane radio resources for a certain ACDC category and the UE supports ACDC, then the service request procedure shall be started.

Otherwise:

- In WB-S1 mode, if access is barred for "originating calls" (see 3GPP TS 36.331 [22]), the service request procedure shall not be started. The UE stays in the current serving cell and applies normal cell reselection process. The service request procedure may be started if it is still necessary when access for "originating calls" is granted or because of a cell change.

- In NB-S1 mode, if access is barred for "originating calls" (see 3GPP TS 36.331 [22]), the service request procedure shall not be started. The UE stays in the current serving cell and applies normal cell reselection process. Further UE behaviour is implementation specific, e.g. the service request procedure is started again after an implementation dependent time; or

In NB-S1 mode, if access is barred for "originating calls" (see 3GPP TS 36.331 [22]), and a request for an exceptional event is received from the upper layers, then the service request procedure shall be started.

NOTE 2: In NB-S1 mode, the EMM layer cannot receive the access barring alleviation indication from the lower layers (see 3GPP TS 36.331 [22]).

b) Lower layer failure or release of the NAS signalling connection without "Extended wait time", without "Extended wait time CP data", and without redirection indication received from lower layers before the service request procedure is completed (see clause 5.6.1.4) or before SERVICE REJECT message is received

If the service request was initiated for CS fallback and a CS fallback cancellation request was not received, the UE shall attempt to select GERAN or UTRAN radio access technology. If the UE finds a suitable GERAN or UTRAN cell, it then proceeds with the appropriate MM and CC specific procedures and the EMM sublayer shall not indicate the abort of the service request procedure to the MM sublayer. Otherwise the EMM sublayer shall indicate the abort of the service request procedure to the MM sublayer, and the UE shall also set the EPS update status to EU2 NOT UPDATED and enter the state EMM-REGISTERED.ATTEMPTING-TO-UPDATE.

If the service request was initiated for CS fallback and a CS fallback cancellation request was received, the UE shall set the EPS update status to EU2 NOT UPDATED and enter the state EMM-REGISTERED.ATTEMPTING-TO-UPDATE.

If the service request was initiated for 1xCS fallback, the UE shall either:

- attempt to select cdma2000® 1x radio access technology and proceed with appropriate cdma2000® 1x CS procedures. If the UE fails to select cdma2000® 1x radio access technology, the UE shall set the EPS update status to EU2 NOT UPDATED and enter the state EMM-REGISTERED.ATTEMPTING-TO-UPDATE; or

- set the EPS update status to EU2 NOT UPDATED and enter the state EMM-REGISTERED.ATTEMPTING-TO-UPDATE, and perform cell selection according to 3GPP TS 36.304 [21].

If the service request was not initiated for CS fallback or 1xCS fallback, the UE shall enter state EMM-REGISTERED.

The UE shall abort the service request procedure, stop timer T3417, T3417ext or T3417ext-mt and locally release any resources allocated for the service request procedure.

c) T3417 expired

The UE shall enter the state EMM-REGISTERED.

If the UE triggered the service request procedure in EMM-IDLE mode in order to obtain packet services, then the EMM sublayer shall increment the service request attempt counter, abort the procedure and release locally any resources allocated for the service request procedure. The service request counter shall not be incremented, if:

- the service request procedure is initiated to establish a PDN connection for emergency bearer services;

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

- the UE is a UE configured to use AC11 – 15 in selected PLMN;

- the service request is initiated in response to paging from the network; or

- the UE in NB-S1 mode is requested by the upper layer to transmit user data related to an exceptional event and the UE is allowed to use exception data reporting (see the ExceptionDataReportingAllowed leaf of the NAS configuration MO in 3GPP TS 24.368 [15A] or the USIM file EFNASCONFIG in 3GPP TS 31.102 [17]).

If the service request attempt counter is greater than or equal to 5, the UE shall start timer T3325 (see 3GPP TS 24.008 [13]). Additionally if the service request was initiated for an "originating MMTEL voice" call type or an "originating MMTEL video" call type, a notification that the service request was not accepted and that timer T3325 is running shall be provided to the upper layers.

NOTE 3: This can result in the upper layers requesting establishment of a CS voice call (if not already attempted in the CS domain), or other implementation specific mechanisms (see 3GPP TS 24.173 [13E]).

The UE shall not attempt service request until expiry of timer T3325 unless:

- the service request is initiated in response to paging from the network;

- the UE is a UE configured to use AC11 – 15 in selected PLMN;

- the service request is initiated to establish a PDN connection for emergency bearer services;

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

- the UE is registered in a new PLMN; or

- the UE in NB-S1 mode is requested by the upper layer to transmit user data related to an exceptional event and the UE is allowed to use exception data reporting (see the ExceptionDataReportingAllowed leaf of the NAS configuration MO in 3GPP TS 24.368 [15A] or the USIM file EFNASCONFIG in 3GPP TS 31.102 [17]).

If the service request for "originating MMTEL voice" call type was triggered while T3325 is running, a notification that the service request was not accepted and that timer T3325 is running shall be provided to the upper layers.

NOTE 4: This can result in the upper layers requesting establishment of a CS voice call (if not already attempted in the CS domain), or other implementation specific mechanisms (see 3GPP TS 24.173 [13E]).

NOTE 5: The NAS signalling connection can also be released if the UE deems that the network has failed the authentication check as specified in clause 5.4.2.7.

If the UE triggered the service request procedure in order to obtain services other than packet services from EMM-IDLE mode, then the EMM sublayer shall abort the procedure and release locally any resources allocated for the service request procedure.

If the UE triggered the service request procedure in EMM-CONNECTED mode, the EMM sublayer shall abort the procedure and consider the service request procedure with "active" flag set or the 1xCS fallback procedure as failed. The UE shall stay in EMM-CONNECTED mode.

d) T3417ext or T3417ext-mt expired

If a CS fallback cancellation request was not received, the UE shall attempt to select GERAN or UTRAN radio access technology. If the UE finds a suitable GERAN or UTRAN cell, it then proceeds with the appropriate MM and CC specific procedures and the EMM sublayer shall not indicate the abort of the service request procedure to the MM sublayer. Otherwise the EMM sublayer shall indicate the abort of the service request procedure to the MM sublayer, and the UE shall also set the EPS update status to EU2 NOT UPDATED and enter the state EMM-REGISTERED.ATTEMPTING-TO-UPDATE.

If a CS fallback cancellation request was received the UE shall set the EPS update status to EU2 NOT UPDATED and enter the state EMM-REGISTERED.ATTEMPTING-TO-UPDATE.

e) SERVICE REJECT received, other EMM cause values than those treated in clause 5.6.1.5, and cases of EMM cause values #22, #25, #31 and #78 if considered as abnormal cases according to clause 5.6.1.5.

If the service request was initiated for CS fallback and a CS fallback cancellation request was not received, the UE shall attempt to select GERAN or UTRAN radio access technology. If the UE finds a suitable GERAN or UTRAN cell, it then proceeds with the appropriate MM and CC specific procedures and the EMM sublayer shall not indicate the abort of the service request procedure to the MM sublayer. Otherwise the EMM sublayer shall indicate the abort of the service request procedure to the MM sublayer, and the UE shall also set the EPS update status to EU2 NOT UPDATED and enter the state EMM-REGISTERED.ATTEMPTING-TO-UPDATE.

If the service request was initiated for CS fallback and a CS fallback cancellation request was received, the UE shall set the EPS update status to EU2 NOT UPDATED and enter the state EMM-REGISTERED.ATTEMPTING-TO-UPDATE.

If the service request was initiated for 1xCS fallback, the UE shall select cdma2000® 1x radio access technology. The UE then proceeds with appropriate cdma2000® 1x CS procedures.

If the service request was initiated for 1xCS fallback and the UE has dual Rx/Tx configuration and supports enhanced 1xCS fallback, then upon entering EMM-IDLE mode the UE shall perform tracking area updating procedure.

If the service request was not initiated for CS fallback or 1xCS fallback, the UE shall enter state EMM-REGISTERED.

The UE shall abort the service request procedure, stop timer T3417, T3417ext or T3417ext-mt and locally release any resources allocated for the service request procedure.

f) Tracking area updating procedure is triggered

The UE shall abort the service request procedure, stop timer T3417, T3417ext or T3417ext-mt if running and perform the tracking area updating procedure. The "active" flag shall be set in the TRACKING AREA UPDATE REQUEST message. If the service request was initiated for CS fallback or 1xCS fallback, and the CS fallback cancellation request was not received, the UE shall send the EXTENDED SERVICE REQUEST message to the MME by using the existing NAS signalling connection after the completion of the tracking area updating procedure. If the TRACKING AREA UPDATE ACCEPT message includes a UE radio capability ID deletion indication IE set to "Network-assigned UE radio capability IDs deletion requested", the UE shall not initiate a new tracking area update procedure, but shall proceed with sending the EXTENDED SERVICE REQUEST message by using the existing NAS signalling connection after the completion of the tracking area updating procedure.

g) Switch off

If the UE is in state EMM-SERVICE-REQUEST-INITIATED at switch off, the detach procedure shall be performed.

h) Detach procedure collision

EPS detach containing detach type "re-attach required":

If the UE receives a DETACH REQUEST message from the network in state EMM-SERVICE-REQUEST-INITIATED, the UE shall take the following actions:

- If the service request was initiated for CS fallback, the UE shall attempt to select GERAN or UTRAN radio access technology. If the UE finds a suitable GERAN or UTRAN cell, it then proceeds with the appropriate MM, CC and GMM specific procedures and the EMM sublayer shall not indicate the abort of the service request procedure to the MM sublayer. Otherwise the EMM sublayer shall indicate the abort of the service request procedure to the MM sublayer;

- If the service request was initiated for 1xCS fallback, the UE shall attempt to select cdma2000® 1x radio access technology. The UE then proceeds with appropriate cdma2000® 1x CS procedures; or

- If the service request was not initiated for CS fallback or 1xCS fallback, the detach procedure shall be progressed and the service request procedure shall be aborted.

EPS detach containing detach type "re-attach not required":

If the UE receives a DETACH REQUEST message from the network in state EMM-SERVICE-REQUEST-INITIATED, the UE shall take the following actions:

- If the DETACH REQUEST message contains an EMM cause other than #2 "IMSI unknown in HSS" or no EMM cause IE, the detach procedure shall be progressed and the service request procedure shall be aborted. Additionally, if the service request was initiated for CS fallback or 1xCS fallback, but not for CS fallback for emergency call or 1xCS fallback for emergency call, the EMM sublayer shall indicate to the MM sublayer or the cdma2000® upper layers that the CS fallback or 1xCS fallback procedure has failed; or

If the DETACH REQUEST message contains EMM cause #2 "IMSI unknown in HSS", the UE will follow the procedure as described below for the detach type "IMSI detach".

EPS detach containing detach type "IMSI detach":

If the UE receives a DETACH REQUEST message from the network in state EMM-SERVICE-REQUEST-INITIATED, the UE shall take the following actions:

- if the service request was initiated for SMS over NAS or CS fallback, but not for CS fallback for emergency call, the UE shall abort the service request procedure and progress the detach procedure; or

- otherwise the UE shall progress both procedures.

i) Transmission failure of SERVICE REQUEST, CONTROL PLANE SERVICE REQUEST or EXTENDED SERVICE REQUEST message indication with TAI change from lower layers

If the current TAI is not in the TAI list, the service request procedure shall be aborted to perform the tracking area updating procedure. The "active" flag shall be set in the TRACKING AREA UPDATE REQUEST message. If the service request was initiated for CS fallback or 1xCS fallback, and the CS fallback cancellation request was not received, the UE shall send the EXTENDED SERVICE REQUEST message to the MME by using the existing NAS signalling connection after the completion of the tracking area updating procedure.

If the current TAI is still part of the TAI list, the UE shall restart the service request procedure.

j) Transmission failure of SERVICE REQUEST, CONTROL PLANE SERVICE REQUEST or EXTENDED SERVICE REQUEST message indication without TAI change from lower layers

The UE shall restart the service request procedure.

k) Default or dedicated bearer set up failure

If the lower layers indicate a failure to set up a radio bearer, the UE shall locally deactivate the EPS bearer as described in clause 6.4.4.6.

l) "Extended wait time" from the lower layers

The UE shall abort the service request procedure, enter state EMM-REGISTERED, and stop timer T3417, T3417ext or T3417ext-mt if still running.

If the EXTENDED SERVICE REQUEST or CONTROL PLANE SERVICE REQUEST message contained the low priority indicator set to "MS is configured for NAS signalling low priority", the UE shall start timer T3346 with the "Extended wait time" value.

If the SERVICE REQUEST message was sent by a UE configured for NAS signalling low priority, the UE shall start timer T3346 with the "Extended wait time" value.

If the EXTENDED SERVICE REQUEST or CONTROL PLANE SERVICE REQUEST message did not contain the low priority indicator set to "MS is configured for NAS signalling low priority" or if the SERVICE REQUEST message was sent by a UE not configured for NAS signalling low priority, the UE is operating in NB-S1 mode and the UE is not a UE configured to use AC11 – 15 in selected PLMN, then the UE shall start timer T3346 with the "Extended wait time" value.

In other cases the UE shall ignore the "Extended wait time".

The UE stays in the current serving cell and applies normal cell reselection process. The service request procedure is started, if still necessary, when timer T3346 expires or is stopped.

If the service request was initiated for CS fallback and a CS fallback cancellation request was not received, the UE in CS/PS mode 1 of operation shall attempt to select GERAN or UTRAN radio access technology. If the UE finds a suitable GERAN or UTRAN cell, it then proceeds with the appropriate MM and CC specific procedures and the EMM sublayer shall not indicate the abort of the service request procedure to the MM sublayer. Otherwise the EMM sublayer shall indicate the abort of the service request procedure to the MM sublayer.

NOTE 5: If the UE disables the E-UTRA capability, then subsequent mobile terminating calls could fail.

If the service request was initiated for CS fallback for emergency call and a CS fallback cancellation request was not received, the UE may attempt to select GERAN or UTRAN radio access technology. It then proceeds with appropriate MM and CC specific procedures. The EMM sublayer shall not indicate the abort of the service request procedure to the MM sublayer.

If the service request was initiated for 1xCS fallback, the UE shall select cdma2000® 1x radio access technology. The UE then proceeds with appropriate cdma2000® 1x CS procedures.

If the service request was initiated for 1xCS fallback for emergency call, the UE may select cdma2000® 1x radio access technology. The UE then proceeds with appropriate cdma2000® 1x CS procedures.

If the service request was initiated due to a request from the SMS entity to send an SMS and timer T3246 is not running, the UE, if operating in CS/PS mode 1 of operation, may select GERAN or UTRAN radio access technology. It then proceeds with the appropriate MM procedure.

NOTE 6: If the UE disables the E-UTRA capability, then subsequent mobile terminating calls could fail.

la) "Extended wait time CP data" from the lower layers

The UE shall abort the service request procedure for transfer of user data via the control plane, enter state EMM-REGISTERED, and stop timer T3417 if still running.

If the UE is operating in NB-S1 mode and supports the timer T3448, the UE shall start the timer T3448 with the "Extended wait time CP data" value. If the UE is operating in NB-S1 mode and does not support the timer T3448, the UE shall start the timer T3346 with the "Extended wait time CP data" value.

In other cases the UE shall ignore the "Extended wait time CP data".

The UE stays in the current serving cell and applies normal cell reselection process. The service request procedure for transfer of user data via the control plane is started, if still necessary, when the timer T3448 expires or is stopped.

m) Timer T3346 is running

The UE shall not start the service request procedure unless:

- the UE receives a paging;

- the UE is a UE configured to use AC11 – 15 in selected PLMN;

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

- the UE is requested by the upper layer for a CS fallback for emergency call or a 1xCS fallback for emergency call;

- the UE has a PDN connection established without the NAS signalling low priority indication or is establishing a PDN connection without the NAS signalling low priority indication and if the timer T3346 was started due to rejection of a NAS request message (e.g. ATTACH REQUEST, TRACKING AREA UPDATE REQUEST, EXTENDED SERVICE REQUEST or CONTROL PLANE SERVICE REQUEST) which contained the low priority indicator set to "MS is configured for NAS signalling low priority"; or

- the UE in NB-S1 mode is requested by the upper layer to transmit user data related to an exceptional event and:

- the UE is allowed to use exception data reporting (see the ExceptionDataReportingAllowed leaf of the NAS configuration MO in 3GPP TS 24.368 [15A] or the USIM file EFNASCONFIG in 3GPP TS 31.102 [17]); and

- timer T3346 was not started when NAS signalling connection was established with RRC establishment cause set to "MO exception data".

If the UE is in EMM-IDLE mode, the UE stays in the current serving cell and applies normal cell reselection process. The service request procedure is started, if still necessary, when timer T3346 expires or is stopped.

Upon upper layer's request for a mobile originated CS fallback which is not for emergency call, the UE in CS/PS mode 1 of operation shall attempt to select GERAN or UTRAN radio access technology. If the UE finds a suitable GERAN or UTRAN cell, it then proceeds with the appropriate MM and CC specific procedures and the EMM sublayer shall not indicate the abort of the service request procedure to the MM sublayer. Otherwise the EMM sublayer shall indicate the abort of the service request procedure to the MM sublayer.

NOTE 7: If the UE disables the E-UTRA capability, then subsequent mobile terminating calls could fail.

Upon upper layer's request for a CS fallback for emergency call, the UE may select GERAN or UTRAN radio access technology. It then proceeds with appropriate MM and CC specific procedures. The EMM sublayer shall not indicate the abort of the service request procedure to the MM sublayer.

Upon a request from the SMS entity to send an SMS and timer T3246 is not running, the UE, if operating in CS/PS mode 1 of operation, may select GERAN or UTRAN radio access technology. It then proceeds with the appropriate MM procedure.

NOTE 8: If the UE disables the E-UTRA capability, then subsequent mobile terminating calls could fail.

Upon upper layer's request for a mobile originated 1x CS fallback which is not for emergency call, the UE shall select cdma2000® 1x radio access technology. The UE then proceeds with appropriate cdma2000® 1x CS call procedures.

Upon upper layer's request for a 1xCS fallback for emergency call, the UE may select cdma2000® 1x radio access technology. The UE then proceeds with appropriate cdma2000® 1x CS call procedures.

If the service request procedure was triggered for an MO MMTEL voice call is started, a notification that the service request procedure was not initiated due to congestion shall be provided to the upper layers.

NOTE 9: This can result in the upper layers requesting establishment of the originating voice call on an alternative manner e.g. requesting establishment of a CS voice call (see 3GPP TS 24.173 [13E]).

n) Failure to find a suitable GERAN or UTRAN cell, after release of the NAS signalling connection without "Extended wait time" and with redirection indication received from lower layers when the service request was initiated for CS fallback

The EMM sublayer shall indicate the abort of the service request procedure to the MM sublayer, and the UE shall also set the EPS update status to EU2 NOT UPDATED and enter the state EMM-REGISTERED.ATTEMPTING-TO-UPDATE.

The UE shall abort the service request procedure, stop timer T3417ext or T3417ext-mt and locally release any resources allocated for the service request procedure.

o) Timer T3448 is running

The UE in EMM-IDLE mode shall not initiate the service request procedure for transport of user data via the control plane unless:

- the UE is a UE configured to use AC11 – 15 in selected PLMN;

- the UE which is only using EPS services with control plane CIoT EPS optimization received a paging; or

- the UE in NB-S1 mode is requested by the upper layer to transmit user data related to an exceptional event and the UE is allowed to use exception data reporting (see the ExceptionDataReportingAllowed leaf of the NAS configuration MO in 3GPP TS 24.368 [15A] or the USIM file EFNASCONFIG in 3GPP TS 31.102 [17]).

The UE stays in the current serving cell and applies the normal cell reselection process.

p) Timer T3447 is running

The UE shall not start any service request procedure unless:

- the UE receives a paging;

- the UE is a UE configured to use AC11 – 15 in selected PLMN;

- the UE has a PDN connection for emergency bearer services established or is establishing a PDN connection for emergency bearer services.

The UE stays in the current serving cell and applies the normal cell reselection process. The service request procedure is started, if still necessary, when timer T3447 expires.

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