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

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

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
|  |
|  | **24.501** | **CR** | **3268** | **rev** | **2** | **Current version:** | **17.2.1** |  |
|  |
| *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:***  | Updates to Service Request for MUSIM Leaving and Reject Paging in 5GS |
|  |  |
| ***Source to WG:*** | Apple, InterDigital, Ericsson, Nokia, Nokia Shanghai Bell, Intel, China Telecom |
| ***Source to TSG:*** | C1 |
|  |  |
| ***Work item code:*** | MUSIM |  | ***Date:*** | 2021-05-02 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | Rel-17 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)...Rel-15 (Release 15)Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)* |
|  |  |
| ***Reason for change:*** | S2-2103033 (CR 2724 for 23.502) was endorsed and then later on revised to S2-2103791. The stage-2 CR introduces a feature for MUSIM devices wherein UE can request network to release NAS connection and also provide paging filtering information when UE is connected to the 5GC.S2-2103030 (CR 2558 for 23.502) was endorsed. The stage-2 CR introduces Reject paging indication response for MUSIM devices.Corresponding stage-3 changes are required for 5GS. |
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| ***Summary of change:*** | - Abbreviation MUSIM added- New IE UE request type: Refer to 24.301- New IE Paging restriction: Refer to 24.301- Updates to Service Request and Control Plane Service Request message due to inclusion of above IEs- Updates to Service Request procedure: Trigger condition added to release NAS connection in connected mode and include paging preferences. Another trigger condition added for rejecting paging in idle mode. UE requests to release NAS connection and in addition specifies paging restriction preferences in SERVICE REQUEST and CPSR messages. Updates on network side for AMF to handle leaving request and store or delete paging restrictions and apply these restrictions accordingly in paging procedure. For case of reject paging which is initiated in idle mode the AMF initiates the release of the N1 NAS signalling connection after the completion of the generic UE configuration update procedure that is triggered after the completion of the service request procedure, so that the AMF can assign the UE a new GUTI. For case of NAS connection release in connected mode, the AMF releases the NAS connection on completion of service request procedure as there is no need to allocate a new 5G-GUTI in this case.  |
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| ***Consequences if not approved:*** | Co-ordinated leaving functionality and Reject Paging functionality is not supported for a UE supporting MUSIM. |
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| ***Clauses affected:*** | 3.2, 5.6.1.1, 5.6.1.2.1, 5.6.1.2.2, 5.6.1.4.1, 5.6.1.4.2, 8.2.16.1, 8.2.16.X(new), 8.2.16.Y(new), 8.2.30.1, 8.2.30.X(new), 8.2.30.Y(new), 9.11.3.XX (new), 9.11.3.YY (new) |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** | **X** |  |  Other core specifications  | TS 23.401 CR 3534  |
| ***affected:*** | **X** |  |  Test specifications | TS 23.502 CR 2724  |
| ***(show related CRs)*** | **X** |  |  O&M Specifications | TS 23.502 CR 2558  |
|  |  |
| ***Other comments:*** | S2-2103033 (CR 2724 for 23.502) was endorsed for LeavingS2-2103030 (CR 2558 for 23.502) was endorsed for Reject Paging.CT1 CR#3534 for 23.401 includes definitions of IE, UE request type which is used by this CR |
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| ***This CR's revision history:*** |  |

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

## 3.2 Abbreviations

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

4G-GUTI 4G-Globally Unique Temporary Identifier

5GCN 5G Core Network

5G-GUTI 5G-Globally Unique Temporary Identifier

5GMM 5GS Mobility Management

5G-RG 5G Residential Gateway

5G-BRG 5G Broadband Residential Gateway

5G-CRG 5G Cable Residential Gateway

5GS 5G System

5GSM 5GS Session Management

5G-S-TMSI 5G S-Temporary Mobile Subscription Identifier

5G-TMSI 5G Temporary Mobile Subscription Identifier

5QI 5G QoS Identifier

ACS Auto-Configuration Server

AKA Authentication and Key Agreement

AKMA Authentication and Key Management for Applications

A-KID AKMA Key Identifier

A-TID AKMA Temporary Identifier

AMBR Aggregate Maximum Bit Rate

AMF Access and Mobility Management Function

APN Access Point Name

ATSSS Access Traffic Steering, Switching and Splitting

AUSF Authentication Server Function

CAG Closed access group

CHAP Challenge Handshake Authentication Protocol

DDX Downlink Data Expected

DL Downlink

DN Data Network

DNN Data Network Name

eDRX Extended DRX cycle

DS-TT Device-Side TSN Translator

EUI Extended Unique Identifier

E-UTRAN Evolved Universal Terrestrial Radio Access Network

EAP-AKA' Improved Extensible Authentication Protocol method for 3rd generation Authentication and Key Agreement

ECIES Elliptic Curve Integrated Encryption Scheme

EPD Extended Protocol Discriminator

EMM EPS Mobility Management

EPC Evolved Packet Core Network

EPS Evolved Packet System

ESM EPS Session Management

FN-RG Fixed Network RG

FN-BRG Fixed Network Broadband RG

FN-CRG Fixed Network Cable RG

Gbps Gigabits per second

GFBR Guaranteed Flow Bit Rate

GUAMI Globally Unique AMF Identifier

IAB Integrated access and backhaul

IMEI International Mobile station Equipment Identity

IMEISV International Mobile station Equipment Identity and Software Version number

IMSI International Mobile Subscriber Identity

IP-CAN IP-Connectivity Access Network

KSI Key Set Identifier

LADN Local Area Data Network

LCS LoCation Services

LMF Location Management Function

LPP LTE Positioning Protocol

MAC Message Authentication Code

MA PDU Multi-Access PDU

Mbps Megabits per second

MFBR Maximum Flow Bit Rate

MICO Mobile Initiated Connection Only

MUSIM Multi-USIM

N3IWF Non-3GPP Inter-Working Function

N5CW Non-5G-Capable over WLAN

N5GC Non-5G Capable

NAI Network Access Identifier

NITZ Network Identity and Time Zone

NR New Radio

ngKSI Key Set Identifier for Next Generation Radio Access Network

NPN Non-public network

NSSAA Network slice-specific authentication and authorization

NSSAAF NSSAA Function

NSSAI Network Slice Selection Assistance Information

OS Operating System

OS Id OS Identity

PAP Password Authentication Protocol

PCO Protocol Configuration Option

PEI Permanent Equipment Identifier

PNI-NPN Public Network Integrated Non-Public Network

PTI Procedure Transaction Identity

QFI QoS Flow Identifier

QoS Quality of Service

QRI QoS Rule Identifier

RACS Radio Capability Signalling Optimisation

(R)AN (Radio) Access Network

RFSP RAT Frequency Selection Priority

RG Residential Gateway

RPLMN Registered PLMN

RQA Reflective QoS Attribute

RQI Reflective QoS Indication

RSNPN Registered SNPN

S-NSSAI Single NSSAI

SA Security Association

SDF Service Data Flow

SMF Session Management Function

SGC Service Gap Control

SNN Serving Network Name

SNPN Stand-alone Non-Public Network

SOR Steering of Roaming

SUCI Subscription Concealed Identifier

SUPI Subscription Permanent Identifier

TA Tracking Area

TAC Tracking Area Code

TAI Tracking Area Identity

Tbps Terabits per second

TNGF Trusted Non-3GPP Gateway Function

TSC Time Sensitive Communication

TWIF Trusted WLAN Interworking Function

TSN Time-Sensitive Networking

UDM Unified Data Management

UL Uplink

UPDS UE policy delivery service

UPF User Plane Function

UPSC UE Policy Section Code

UPSI UE Policy Section Identifier

URN Uniform Resource Name

URSP UE Route Selection Policy

V2X Vehicle-to-Everything

V2XP V2X policy

W-AGF Wireline Access Gateway Function

WLAN Wireless Local Area Network

WUS Wake-up signal

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

### 5.6.1 Service request procedure

#### 5.6.1.1 General

The purpose of the service request procedure is to change the 5GMM mode from 5GMM-IDLE to 5GMM-CONNECTED mode. If the UE is not using 5GS services with control plane CIoT 5GS optimization, this procedure is used to request the establishment of user-plane resources for PDU sessions which are established without user-plane resources. In latter case, the 5GMM mode can be the 5GMM-IDLE mode or the 5GMM-CONNECTED mode if the UE requires to establish user-plane resources for PDU sessions. If the UE is using 5GS services with control plane CIoT 5GS optimization, this procedure can be used for UE initiated transfer of user data via the control plane from 5GMM-IDLE mode.

NOTE 1: The lower layer indicates when the user-plane resources for PDU sessions are successfully established or released.

This procedure is used when:

- the network has downlink signalling pending over 3GPP access and the UE is in 5GMM-IDLE mode over 3GPP access;

- the network has downlink signalling pending over non-3GPP access, the UE is in 5GMM-IDLE mode over non-3GPP access and in 5GMM-IDLE or 5GMM-CONNECTED mode over 3GPP access;

- the UE has uplink signalling pending over 3GPP access and the UE is in 5GMM-IDLE mode over 3GPP access;

- the network has downlink user data pending over 3GPP access and the UE is in 5GMM-IDLE mode over 3GPP access;

- the network has downlink user data pending over non-3GPP access, the UE is in 5GMM-IDLE mode over non-3GPP access and in 5GMM-IDLE or 5GMM-CONNECTED mode over 3GPP access;

- the UE has user data pending over 3GPP access and the UE is in 5GMM-IDLE or 5GMM-CONNECTED mode over 3GPP access;

- the UE has user data pending over non-3GPP access and the UE is in 5GMM-CONNECTED mode over non-3GPP access;

- the UE in 5GMM-IDLE mode over non-3GPP access, receives an indication from the lower layers of non-3GPP access, that the access stratum connection is established between UE and network, if T3346 is not running;

- the UE in 5GMM-IDLE or 5GMM-CONNECTED mode over 3GPP access receives a request from the upper layers to perform emergency services fallback and performs emergency services fallback as specified in subclause 4.13.4.2 of 3GPP TS 23.502 [9];

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

- the UE supporting MUSIM requests the release of the NAS signalling connection or reject paging.

This procedure shall not be used for initiating user data transfer or PDU session management related signalling other than for performing UE-requested PDU session release procedure related to a PDU session for LADN when the UE is located outside the LADN service area.

In NB-N1 mode, this procedure shall not be used to request the establishment of user-plane resources:

a) for a number of PDU sessions that exceeds the UE' s maximum number of supported user-plane resources if there is currently:

if there is currently:

1) no user-plane resources established for the UE;

2) user-plane resources established for:

i) one PDU session and the Multiple user-plane resources support bit was set to "Multiple user-plane resources not supported" in the 5GMM capability IE; or

ii) two PDU sessions and the Multiple user-plane resources support bit was set to "Multiple user-plane resources supported" in the 5GMM capability IE; or

b) for additional PDU sessions, if the number of PDU sessions for which user-plane resources are currently established is equal to the UE's maximum number of supported user-plane resources.

The service request procedure is initiated by the UE, however, it can be triggered by the network by means of:

- the paging procedure (see subclause 5.6.2) for the transfer of downlink signalling or user data pending over 3GPP access to a UE in 5GMM-IDLE mode over 3GPP access;

- the paging procedure (see subclause 5.6.2) for the transfer of downlink signalling or user data pending over non-3GPP access to a UE in 5GMM-IDLE mode over 3GPP access and in 5GMM-IDLE mode over non-3GPP access;

- the notification procedure (see subclause 5.6.3) for the transfer of downlink signalling or user data pending over non-3GPP access to a UE in 5GMM-CONNECTED mode over 3GPP access and in 5GMM-IDLE mode over non-3GPP access; or

- the notification procedure (see subclause 5.6.3) for the transfer of downlink signalling or user data pending over 3GPP access to a UE in 5GMM-IDLE mode over 3GPP access and in 5GMM-CONNECTED mode over non-3GPP access.

NOTE 2: In case the UE is in 5GMM-IDLE mode over 3GPP access and in 5GMM-CONNECTED mode over non-3GPP access and downlink signalling or user data pending over 3GPP access needs to be transferred, the AMF can trigger either the notification procedure or the paging procedure based on implementation.

The UE shall invoke the service request procedure when:

a) the UE, in 5GMM-IDLE mode over 3GPP access, receives a paging request from the network;

b) the UE, in 5GMM-CONNECTED mode over 3GPP access, receives a notification from the network with access type indicating non-3GPP access;

c) the UE, in 5GMM-IDLE mode over 3GPP access, has uplink signalling pending (except in case i);

d) the UE, in 5GMM-IDLE mode over 3GPP access, has uplink user data pending (except in case j);

e) the UE, in 5GMM-CONNECTED mode or in 5GMM-CONNECTED mode with RRC inactive indication, has user data pending due to no user-plane resources established for PDU session(s) used for user data transport;

f) the UE in 5GMM-IDLE mode over non-3GPP access, with T3346 not active or upon expiry of T3346, receives or has already received an indication from the lower layers of non-3GPP access, that the access stratum connection is established between UE and network;

g) the UE, in 5GMM-IDLE mode over 3GPP access, receives a notification from the network with access type indicating 3GPP access when the UE is in 5GMM-CONNECTED mode over non-3GPP access;

h) the UE, in 5GMM-IDLE, 5GMM-CONNECTED mode over 3GPP access, or 5GMM-CONNECTED mode with RRC inactive indication, receives a request from the upper layers to perform emergency services fallback and performs emergency services fallback as specified in subclause 4.13.4.2 of 3GPP TS 23.502 [9];

i) the UE, in 5GMM-CONNECTED mode over 3GPP access or in 5GMM-CONNECTED mode with RRC inactive indication, receives a fallback indication from the lower layers (see subclauses 5.3.1.2 and 5.3.1.4) and the UE has a pending NAS procedure other than a registration, service request, or de-registration procedure;

j) the UE, in 5GMM-CONNECTED mode over 3GPP access or in 5GMM-CONNECTED mode with RRC inactive indication, receives a fallback indication from the lower layers (see subclauses 5.3.1.2 and 5.3.1.4) and the UE has pending uplink user data for PDU session(s) with user-plane resources already established but no pending NAS procedure;

k) the UE, in 5GMM-CONNECTED mode and has a NAS signalling connection only, is using 5GS services with control plane CIoT 5GS optimization and has pending user data to be sent via user-plane resources;

l) the UE in 5GMM-IDLE mode over 3GPP access has to request resources for V2X communication over PC5 (see 3GPP TS 23.287 [6C]); or

m) the UE supports MUSIM, in 5GMM-CONNECTED mode requests the network to release the NAS signalling connection and optionally includes paging restrictions; or

n) the UE supports MUSIM, in 5GMM-IDLE mode when responding to paging requests the network to reject paging, release the NAS signalling connection and optionally includes paging restrictions.

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

- its 5GS update status is 5U1 UPDATED, and the TAI of the current serving cell is included in the TAI list; and

- no 5GMM specific procedure is ongoing.

The UE shall not invoke the service request procedure when the UE is in the state 5GMM-SERVICE-REQUEST-INITIATED.



Figure 5.6.1.1.1: Service Request procedure (Part 1)



Figure 5.6.1.1.2: Service Request procedure (Part 2)

A service request attempt counter is used to limit the number of service request attempts and no response from the network. The service request attempt counter shall be incremented as specified in subclause 5.6.1.7.

The service request attempt counter shall be reset when:

- a registration procedure for mobility and periodic registration update is successfully completed;

- a service request procedure is successfully completed;

- a service request procedure is rejected as specified in subclause 5.6.1.5 or subclause 5.3.20; or

- the UE moves to 5GMM-DEREGISTERED state.

####

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

#### 5.6.1.2 Service request procedure initiation

##### 5.6.1.2.1 UE is not using 5GS services with control plane CIoT 5GS optimization

The UE initiates the service request procedure by sending a SERVICE REQUEST message to the AMF and starts timer T3517.

If the UE is sending the SERVICE REQUEST message from 5GMM-IDLE mode and the UE needs to send non-cleartext IEs, the UE shall send the SERVICE REQUEST message including the NAS message container IE as described in subclause 4.4.6.

For cases a), b), and g) in subclause 5.6.1.1, the service type IE in the SERVICE REQUEST message shall be set to "mobile terminated services".

For cases c), d), e), f), i), j) and l) in subclause 5.6.1.1, if the UE is a UE configured for high priority access in selected PLMN, the service type IE in the SERVICE REQUEST message shall be set to "high priority access".

For case a) in subclause 5.6.1.1:

a) if the paging request includes an indication for non-3GPP access type, the Allowed PDU session status IE shall be included in the SERVICE REQUEST message. If the UE has established the PDU session(s) associated with the S-NSSAI(s) which are included in the allowed NSSAI for 3GPP access, the UE shall indicate the PDU session(s) for which the UE allows the user-plane resources to be re-established over 3GPP access in the Allowed PDU session status IE. Otherwise, the UE shall not indicate any PDU session(s) in the Allowed PDU session status IE;

b) if the UE has uplink user data pending to be sent over 3GPP access, the Uplink data status IE shall be included in the SERVICE REQUEST message to indicate the PDU session(s) for which the UE has pending user data to be sent; or

c) otherwise, the Uplink data status IE shall not be included in the SERVICE REQUEST message.

For case b) in subclause 5.6.1.1:

a) the Allowed PDU session status IE shall be included in the SERVICE REQUEST message. If the UE has the PDU session(s) associated with the S-NSSAI(s) which are included in the allowed NSSAI for 3GPP access, the UE shall indicate the PDU session(s) for which the UE allows the user-plane resources to be re-established over 3GPP access in the Allowed PDU session status IE. Otherwise, the UE shall not indicate any PDU session(s) in the Allowed PDU session status IE;

b) if the UE has uplink user data pending to be sent over 3GPP access, the Uplink data status IE shall be included in the SERVICE REQUEST message to indicate the PDU session(s) for which the UE has pending user data to be sent;

c) otherwise, the Uplink data status IE shall not be included in the SERVICE REQUEST message.

When the Allowed PDU session status IE is included in the SERVICE REQUEST message, the UE shall indicate that a PDU session is not allowed to be transferred to the 3GPP access if the 3GPP PS data off UE status is "activated" for the corresponding PDU session and the UE is not using the PDU session to send uplink IP packets for any of the 3GPP PS data off exempt services (see subclause 6.2.10).

For case c) in subclause 5.6.1.1, the Uplink data status IE shall not be included in the SERVICE REQUEST message except if the UE has one or more active always-on PDU sessions associated with the access type over which the SERVICE REQUEST message is sent. If the UE is not a UE configured for high priority access in selected PLMN and:

a) if the SERVICE REQUEST message is triggered by a request for emergency services from the upper layer, the UE shall set the service type IE in the SERVICE REQUEST message to "emergency services"; or

b) otherwise, the UE shall set the service type IE to "signalling".

When the UE is in a non-allowed area or is not in an allowed area as specified in subclause 5.3.5 and:

a) if the uplink signalling pending is to indicate a change of 3GPP PS data off UE status for a PDU session, the UE shall set the service type IE in the SERVICE REQUEST message to "elevated signalling", and shall not include the Uplink data status IE in the SERVICE REQUEST message even if the UE has one or more active always-on PDU sessions associated with the access type over which the SERVICE REQUEST message is sent; or

b) otherwise, the UE shall not initiate service request procedure except for emergency services, high priority access or responding to paging or notification.

For cases d) and e) in subclause 5.6.1.1, the Uplink data status IE shall be included in the SERVICE REQUEST message to indicate the PDU session(s) the UE has pending user data to be sent. If the UE is not a UE configured for high priority access in selected PLMN:

a) if there exists an emergency PDU session which is indicated in the Uplink data status IE the service type IE in the SERVICE REQUEST message shall be set to "emergency services"; or

b) otherwise, the service type IE in the SERVICE REQUEST message shall be set to "data".

NOTE 1: For a UE in NB-N1 mode, the Uplink data status IE cannot be used to request the establishment of user-plane resources such that there will be user-plane resources established for a number of PDU sessions that exceeds the UE's maximum number of supported user-plane resources.

For case f) in subclause 5.6.1.1:

a) if the UE has uplink user data pending to be sent, the Uplink data status IE shall be included in the SERVICE REQUEST message to indicate the PDU session(s) the UE has pending user data to be sent. If the UE is not a UE configured for high priority access in selected PLMN, the service type IE in the SERVICE REQUEST message shall be set to "data";

b) otherwise, if the UE is not a UE configured for high priority access in selected PLMN, the service type IE in the SERVICE REQUEST message shall be set to "signalling".

For case g) in subclause 5.6.1.1, if the UE has uplink user data pending to be sent, the Uplink data status IE shall be included in the SERVICE REQUEST message to indicate the PDU session(s) the UE has pending user data to be sent.

For case h) in subclause 5.6.1.1, the UE shall send a SERVICE REQUEST message with service type set to "emergency services fallback" and without an Uplink data status IE.

For case i) in subclause 5.6.1.1, if the UE is not configured for high priority access in selected PLMN, the UE shall set the Service type IE in the SERVICE REQUEST message as follows:

a) if the pending message is an UL NAS TRANSPORT message with the Request type IE set to "initial emergency request" or "existing emergency PDU session", the UE shall set the Service type IE in the SERVICE REQUEST message to "emergency services"; or

b) otherwise, the UE shall set the Service type IE in the SERVICE REQUEST message to "signalling".

For case j) in subclause 5.6.1.1:

a) the UE shall include the Uplink data status IE in the SERVICE REQUEST message indicating the PDU session(s) for which user-plane resources were active prior to receiving the fallback indication, if any; and

b) if the UE is not a UE configured for high priority access in selected PLMN, the UE shall set the Service type IE in the SERVICE REQUEST message as follows:

1) if there is an emergency PDU session which is indicated in the Uplink data status IE, the UE shall set the Service type IE in the SERVICE REQUEST message to "emergency services"; or

2) if there is no emergency PDU session which is indicated in the Uplink data status IE, the UE shall set the Service type IE in the SERVICE REQUEST message to "data".

For case l) in subclause 5.6.1.1, if the UE is not a UE configured for high priority access in selected PLMN:

a) if there exists an emergency PDU session which is indicated in the Uplink data status IE the service type IE in the SERVICE REQUEST message shall be set to "emergency services"; or

b) otherwise, the service type IE in the SERVICE REQUEST message shall be set to "signalling".

For cases m and n in subclause 5.6.1.1, the UE shall not include the Uplink data status IE and the Allowed PDU session status IE in the SERVICE REQUEST message. Further,

- for case m in subclause 5.6.1.1, the UE shall set Request type to "NAS signalling connection release requested" in the UE request type IE and Service type to "signalling";

- for case n in subclause 5.6.1.1, the UE shall set Request type to "Rejection of paging requested" in the UE request type IE and Service type to "mobile terminated services"; and

may include its paging restriction preferences in the Paging restriction IE in the SERVICE REQUEST message.

The UE shall include a valid 5G-S-TMSI in the 5G-S-TMSI IE of the SERVICE REQUEST message.

If the UE has one or more active always-on PDU sessions associated with the access type over which the SERVICE REQUEST message is sent and the user-plane resources for these PDU sessions are not established, the UE shall include the Uplink data status IE in the SERVICE REQUEST message and indicate that the UE has pending user data to be sent for those PDU sessions.

If the UE has one or more active PDU sessions which are not accepted by the network as always-on PDU sessions and no uplink user data pending to be sent for those PDU sessions, the UE shall not include those PDU sessions in the Uplink data status IE in the SERVICE REQUEST message.

The Uplink data status IE may be included in the SERVICE REQUEST message to indicate which PDU session(s) associated with the access type the SERVICE REQUEST message is sent over have pending user data to be sent.

The PDU session status information element may be included in the SERVICE REQUEST message to indicate:

- the single access PDU session(s) not in 5GSM state PDU SESSION INACTIVEin the UE associated with the access type the SERVICE REQUEST message is sent over; and

- the MA PDU session(s) not in 5GSM state PDU SESSION INACTIVE and having user plane resources established in the UE on the access the SERVICE REQUEST message is sent over.

If the SERVICE REQUEST message includes a NAS message container IE, the AMF shall process the SERVICE REQUEST message that is obtained from the NAS message container IE as described in subclause 4.4.6.

If the UE has an emergency PDU session over the non-current access, it shall not initiate the SERVICE REQUEST message with the service type IE set to "emergency services" over the current access, unless the SERVICE REQUEST message has to be initiated to perform handover of an existing emergency PDU session from the non-current access to the current access.

NOTE 2: Transfer of an existing emergency PDU session between 3GPP access and non-3GPP access is needed e.g. if the UE determines that the current access is no longer available.

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

##### 5.6.1.2.2 UE is using 5GS services with control plane CIoT 5GS optimization

The UE shall send a CONTROL PLANE SERVICE REQUEST message, start T3517 and enter the state 5GMM-SERVICE-REQUEST-INITIATED.

For case a), and case b) in subclause 5.6.1.1, the Control plane service type of the CONTROL PLANE SERVICE REQUEST message shall indicate "mobile terminating request". If:

a) the UE only has uplink CIoT user data or SMS to be sent, the UE shall:

1) if the data size is not more than 254 octets and there is no other optional IE to be included in the message:

i) for sending CIoT user data, set the Data type field to "control plane user data", include the PDU session ID, data, and Downlink data expected (DDX) (if available), in the CIoT small data container IE; and

ii) for sending SMS, set the Data type field to "SMS", include SMS in the CIoT small data container IE; and

2) otherwise if the data size is more than 254 octets or there are other optional IEs to be included in the message:

i) for sending CIoT user data, set the Payload container type IE to "CIoT user data container", include the PDU session ID in the PDU session ID IE and include data in the Payload container IE as described in subclause 5.4.5.2.2; and

ii) for sending SMS, set the Payload container type IE to "SMS" and include data in the Payload container IE as described in subclause 5.4.5.2.2; and

b) the paging request includes an indication for non-3GPP access type, the UE has at least one PDU session that is not associated with control plane only indication, the Allowed PDU session status IE shall be included in the CONTROL PLANE SERVICE REQUEST message.

NOTE 1: The term DDX used in the present document corresponds to the term NAS RAI used in 3GPP TS 23.502 [9].

For case c), and case d) if the UE has pending CIoT user data that is to be sent via the control plane in subclause 5.6.1.1, the UE shall set the Control plane service type of the CONTROL PLANE SERVICE REQUEST message to "mobile originating request". If the UE has only uplink CIoT user data, SMS or location services message to be sent, the UE shall:

a) if the data size is not more than 254 octets, there is no other optional IE to be included in the CONTROL PLANE SERVICE REQUEST message, and the data being sent is:

1) CIoT user data, set the Data type field to "control plane user data", include the PDU session ID, data, and Downlink data expected (DDX) (if available), in the CIoT small data container IE;

2) location services message, set the Data type field to "Location services message container" and Downlink data expected (DDX), if available, in the CIoT small data container IE, and:

i) if routing information is provided by upper layers:

A) set the length of additional information field in the CIoT small data container IE to the length of routing information provided by upper layer location services application (see subclause 9.11.3.67), and set the additional information field in the CIoT small data container IE to the routing information provided by upper layer location services application (see subclause 9.11.3.67); or

B) otherwise set the length of additional information field in the CIoT small data container IE to zero. In this case the Additional information field of the CIoT small data container IE shall not be included; and

ii) set the Data contents field of the CIoT small data container IE to the location services message payload; or

3) SMS, set the Data type field to "SMS", include SMS in the CIoT small data container IE; or

b) otherwise if the data size is more than 254 octets or there are other optional IEs to be included in the CONTROL PLANE SERVICE REQUEST message, and the data being sent is:

1) CIoT user data, set the Payload container type IE to "CIoT user data container", include the PDU session ID in the PDU session ID IE and include data in the Payload container IE as described in subclause 5.4.5.2.2;

2) location services message, set the Payload container type IE to "Location services message container", include data in the Payload container IE as described in subclause 5.4.5.2.2. If the upper layer location services application provides the routing information set the Additional information IE to the routing information as described in subclause 5.4.5.2.2; or

3) SMS, set the Payload container type IE to "SMS" and include data in the Payload container IE as described in subclause 5.4.5.2.2.

For case a), and case b) in subclause 5.6.1.1, if the UE has pending user data that is to be sent via the user plane, the UE shall set the Control plane service type of the CONTROL PLANE SERVICE REQUEST message to "mobile terminating request". The UE shall include the Uplink data status IE in the CONTROL PLANE SERVICE REQUEST message to indicate which PDU session(s) have pending user data to be sent via user-plane resources.

For case c) in subclause 5.6.1.1, if the UE is in WB-N1 mode and the CONTROL PLANE SERVICE REQUEST message is triggered by a request for emergency services from the upper layer, the UE shall set the Control plane service type of the CONTROL PLANE SERVICE REQUEST message to "emergency services".

For cases d) and k), if the UE has pending user data that is to be sent via the user plane in subclause 5.6.1.1:

a) and if there exists an emergency PDU session which is indicated in the Uplink data status IE, the UE shall set the Control plane service type of the CONTROL PLANE SERVICE REQUEST message to "emergency services"; or

b) otherwise, the UE shall set the Control plane service type to "mobile originating request".

The UE shall include the Uplink data status IE in the CONTROL PLANE SERVICE REQUEST message to indicate which PDU session(s) have pending user data to be sent via user-plane resources.

NOTE 2: For a UE in NB-N1 mode, the Uplink data status IE cannot be used to request the establishment of user-plane resources such that there will be user-plane resources established for a number of PDU sessions that exceeds the UE's maximum number of supported user-plane resources.

For case h) in subclause 5.6.1.1, if the UE is in WB-N1 mode and the UE does not have any PDU session that is associated with control plane only indication, the UE shall send a CONTROL PLANE SERVICE REQUEST message with the Control plane service type set to "emergency services fallback" and without an Uplink data status IE.

For case i) in subclause 5.6.1.1, the Control plane service type of the CONTROL PLANE SERVICE REQUEST message shall indicate "mobile originating request". If the pending message is an UL NAS TRANSPORT message with the Payload container type IE set to:

a) "SMS", "Location services message container", or "CIoT user data container", the UE shall send the CONTROL PLANE SERVICE REQUEST and include the SMS, location services message, or CIoT user data as described in this subclause; or

b) otherwise, the UE shall send the CONTROL PLANE SERVICE REQUEST:

1) without including the CIoT small data container IE and without including the NAS message container IE if the UE has no other optional IE to be sent; or

2) with the NAS message container IE if the UE has an optional IE to be sent as described in this subclause.

For case j) in subclause 5.6.1.1, the Control plane service type of the CONTROL PLANE SERVICE REQUEST message shall indicate "mobile originating request". The UE shall include the Uplink data status IE in the CONTROL PLANE SERVICE REQUEST message indicating the PDU session(s) for which user-plane resources were active prior to receiving the fallback indication, if any.

For cases m and n in subclause 5.6.1.1, the UE shall not include the Uplink data status IE and the Allowed PDU session status IE in the CONTROL PLANE SERVICE REQUEST message. Further,

- for case m in subclause 5.6.1.1, the UE shall set Request type to "NAS signalling connection release requested" in the UE request type IE and Control plane service type to "mobile originating request";

- for case n in subclause 5.6.1.1, the UE shall set Request type to "Rejection of paging requested" in the UE request type IE and Control plane service type to "mobile terminated services"; and

may include its paging restriction preferences in the Paging restriction IE in the CONTROL PLANE SERVICE REQUEST message.

The UE may include the PDU session status IE in the CONTROL PLANE SERVICE REQUEST message to indicate which PDU session(s) associated with the access type the CONTROL PLANE SERVICE REQUEST message is sent over are active in the UE.

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

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

##### 5.6.1.4.1 UE is not using 5GS services with control plane CIoT 5GS optimization

For cases other than h) in subclause 5.6.1.1, the UE shall treat the reception of the SERVICE ACCEPT message as successful completion of the procedure. The UE shall reset the service request attempt counter, stop timer T3517 and enter the state 5GMM-REGISTERED.

For case h) in subclause 5.6.1.1,

a) the UE shall treat the indication from the lower layers when the UE has changed to S1 mode or E-UTRA connected to 5GCN (see 3GPP TS 23.502 [9]) as successful completion of the procedure and stop timer T3517;

b) if a UE operating in single-registration mode has changed to S1 mode, it shall disable the N1 mode capability for 3GPP access (see subclause 4.9.2); and

c) the AMF shall not check forCAG restrictions.

If the PDU session status information element is included in the SERVICE REQUEST message, then:

a) for single access PDU sessions, the AMF shall:

1) perform a local release of all those PDU sessions which are not in 5GSM state PDU SESSION INACTIVE on the AMF side associated with the access type the SERVICE REQUEST message is sent over, but are indicated by the UE as being in 5GSM state PDU SESSION INACTIVE; and

2) request the SMF to perform a local release of all those PDU sessions; and

b) for MA PDU sessions, the AMF shall:

1) for MA PDU sessions having user plane resources established in the AMF only on the access the SERVICE REQUEST message is sent over, but are indicated by the UE as no user plane resources established:

i) perform a local release of all those MA PDU sessions; and

ii) request the SMF to perform a local release of all those MA PDU sessions; and

2) for MA PDU sessions having user plane resources established on both accesses in the AMF, but are indicated by the UE as no user plane resources established:

i) perform a local release of user plane resources of all those PDU sessions on the access the SERVICE REQUEST message is sent over; and

ii) request the SMF to perform a local release of user plane resources of all those PDU sessions on the access type the SERVICE REQUEST message is sent over.

If the AMF needs to initiate PDU session status synchronization or a PDU session status IE was included in the SERVICE REQUEST message, the AMF shall include a PDU session status IE in the SERVICE ACCEPT message to indicate:

- which single access PDU sessions associated with the access type the SERVICE ACCEPT message is sent over are not in 5GSM state PDU SESSION INACTIVE in the AMF; and

- which MA PDU sessions are not in 5GSM state PDU SESSION INACTIVE and having user plane resources established in the AMF on the access the SERVICE ACCEPT message is sent over.

If the PDU session status information element is included in the SERVICE ACCEPT message, then:

a) for single access PDU sessions, the UE shall perform a local release of all those PDU sessions which are not in 5GSM state PDU SESSION INACTIVE or PDU SESSION ACTIVE PENDING on the UE side associated with the access type the SERVICE ACCEPT message is sent over, but are indicated by the AMF as in 5GSM state PDU SESSION INACTIVE; and

b) for MA PDU sessions, for all those PDU sessions which are not in 5GSM state PDU SESSION INACTIVE or PDU SESSION ACTIVE PENDING and have user plane resources established on the UE side associated with the access the SERVICE ACCEPT message is sent over, but are indicated by the AMF as no user plane resources established:

1) for MA PDU sessions having user plane resources established only on the access type the SERVICE ACCEPT message is sent over, the UE shall perform a local release of those MA PDU sessions; and

2) for MA PDU sessions having user plane resources established on both accesses, the UE shall perform a local release on the user plane resources on the access type the SERVICE ACCEPT message is sent over.

If the Uplink data status IE is included in the SERVICE REQUEST message and the UE is:

a) not in NB-N1 mode; or

b) in NB-N1 mode and the UE does not indicate a request to have user-plane resources established for a number of PDU sessions that exceeds the UE's maximum number of supported user-plane resources;

the AMF shall:

a) indicate the SMF to re-establish the user-plane resources for the corresponding PDU sessions;

b) include the PDU session reactivation result IE in the SERVICE ACCEPT message to indicate the user-plane resources re-establishment result of the PDU sessions for which the UE requested to re-establish the user-plane resources; and

c) determine the UE presence in LADN service area and forward the UE presence in LADN service area towards the SMF, if the corresponding PDU session is a PDU session for LADN.

If the Allowed PDU session status IE is included in the SERVICE REQUEST message, the AMF shall:

a) for a 5GSM message from each SMF that has indicated pending downlink signalling only, forward the received 5GSM message via 3GPP access to the UE after the SERVICE ACCEPT message is sent;

b) for each SMF that has indicated pending downlink data only:

1) notify the SMF that reactivation of the user-plane resources for the corresponding PDU session(s) associated with non-3GPP access cannot be performed if the corresponding PDU session ID(s) are not indicated in the Allowed PDU session status IE; and

2) notify the SMF that reactivation of the user-plane resources for the corresponding PDU session(s) associated with non-3GPP access can be performed if:

i) for a UE not in NB-N1 mode, the corresponding PDU session ID(s) are indicated in the Allowed PDU session status IE; or

ii) for a UE in NB-N1 mode, the corresponding PDU session ID(s) are indicated in the Allowed PDU session status IE, and the resulting number of PDU sessions with established user-plane resources does not exceed the UE's maximum number of supported user-plane resources;

c) for each SMF that have indicated pending downlink signalling and data:

1) notify the SMF that reactivation of the user-plane resources for the corresponding PDU session(s) associated with non-3GPP access cannot be performed if the corresponding PDU session ID(s) are not indicated in the Allowed PDU session status IE;

2) notify the SMF that reactivation of the user-plane resources for the corresponding PDU session(s) associated with non-3GPP access can be performed if:

i) for a UE not in NB-N1 mode, the corresponding PDU session ID(s) are indicated in the Allowed PDU session status IE; or

ii) for a UE in NB-N1 mode, the corresponding PDU session ID(s) are indicated in the Allowed PDU session status IE, and the resulting number of PDU sessions with established user-plane resources does not exceed the UE's maximum number of supported user-plane resources; and

3) discard the received 5GSM message for PDU session(s) associated with non-3GPP access; and

d) include the PDU session reactivation result IE in the SERVICE ACCEPT message to indicate the successfully re-established user-plane resources for the corresponding PDU sessions, if any.

If due to regional subscription restrictions or access restrictions the UE is not allowed to access the TA or due to CAG restrictions the UE is not allowed access the cell, but the UE has an emergency PDU session established, the AMF may accept the SERVICE REQUEST message and indicate to the SMF to perform a local release of all non-emergency PDU sessions (associated with 3GPP access if it is due to CAG restrictions) and informs the UE via the PDU session status IE in the SERVICE ACCEPT message. The AMF shall not indicate to the SMF to release the emergency PDU session. The network shall behave as if the UE is registered for emergency services.

If the PDU session reactivation result IE is included in the SERVICE ACCEPT message indicating that the user-plane resources have been successfully reactivated for a PDU session that was requested by the UE in the Allowed PDU session status IE, the UE considers the corresponding PDU session to be associated with the 3GPP access. If the user-plane resources of a PDU session have been successfully reactivated over the 3GPP access, the AMF and SMF update the associated access type of the corresponding PDU session.

If the user-plane resources cannot be established for a PDU session, the AMF shall include the PDU session reactivation result IE in the SERVICE ACCEPT message indicating that user-plane resources for the corresponding PDU session cannot be re-established, and:

a) if the user-plane resources cannot be established because the SMF indicated to the AMF that the UE is located out of the LADN service area (see 3GPP TS 29.502 [20A]), the AMF shall include the PDU session reactivation result error cause IE with the 5GMM cause set to #43 "LADN not available";

b) if the user-plane resources cannot be established because the SMF indicated to the AMF that only prioritized services are allowed (see 3GPP TS 29.502 [20A]), the AMF shall include the PDU session reactivation result error cause IE with the 5GMM cause set to #28 "restricted service area";

c) if the user-plane resources cannot be established because the SMF indicated to the AMF that the resource is not available in the UPF (see 3GPP TS 29.502 [20A]), the AMF shall include the PDU session reactivation result error cause IE with the 5GMM cause set to #92 "insufficient user-plane resources for the PDU session"; or

d) otherwise, the AMF may include the PDU session reactivation result error cause IE to indicate the cause of failure to re-establish the user-plane resources.

NOTE: It is up to UE implementation when to re-send a request for user-plane re-establishment for the associated PDU session after receiving a PDU session reactivation result error cause IE with a 5GMM cause set to #92 "insufficient user-plane resources for the PDU session".

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

For cases m and n in subclause 5.6.1.1 when the UE supporting MUSIM sets the Request type to "NAS signalling connection release requested" or to "Rejection of paging requested" in the UE request type IE in the SERVICE REQUEST message and if the UE requests restriction of paging by including the Paging restriction IE, the AMF shall store the paging restriction preferences of the UE and enforce these restrictions in the paging procedure as described in clause 5.6.2. The AMF shall initiate the release of the N1 NAS signalling connection as follows:

- for case m in subclause 5.6.1.1, after the completion of the service request procedure;

- for case n in subclause 5.6.1.1, after the completion of the generic UE configuration update procedure that is triggered after the completion of the service request procedure.

If the SERVICE REQUEST message is for emergency services fallback, the AMF triggers the emergency services fallback procedure as specified in subclause 4.13.4.2 of 3GPP TS 23.502 [9].

If the UE having an emergency PDU session sent the SERVICE REQUEST message via:

a) a CAG cell and none of the CAG-IDs of the CAG cell are included in the "Allowed CAG list" for the current PLMN in the UE's subscription; or

b) a non-CAG cell in a PLMN for which the UE's subscription contains an "indication that the UE is only allowed to access 5GS via CAG cells";

the network shall accept the SERVICE REQUEST message and release all non-emergency PDU sessions locally. The emergency PDU session shall not be released.

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

##### 5.6.1.4.2 UE is using 5GS services with control plane CIoT 5GS optimization

For case a in subclause 5.6.1.1, upon receipt of the CONTROL PLANE SERVICE REQUEST message with Control plane service type indicating "mobile terminating request", after completion of the 5GMM common procedures (if initiated) according to subclause 5.6.1.3, the AMF shall send a SERVICE ACCEPT message.

For case c and d in subclause 5.6.1.1, upon receipt of the CONTROL PLANE SERVICE REQUEST message with Control plane service type indicating "mobile originating request", after completion of the 5GMM common procedures (if initiated) according to subclause 5.6.1.3, the AMF shall send a SERVICE ACCEPT message, except for case d when the DDX field of the Release assistance indication IE or the DDX field of the CIoT small data container IE indicates "No further uplink and no further downlink data transmission subsequent to the uplink data transmission is expected".

For case a, c and d:

a) if the CIoT small data container IE is included in the message, the AMF shall decipher the value part of the CIoT small data container IE and:

1) if the Data type field indicates "control plane user data", extract the PDU session ID and data content from the CIoT small data container IE, look up a PDU session routing context for the UE and the PDU session ID, and forward the content of the CIoT small data container IE to the SMF associated with the UE;

2) if the Data type field indicates "SMS", forward the content of the CIoT small data container IE to the SMSF associated with the UE; or

3) if the Data type field indicates "Location services message container", and if

i) length of additional information field in the CIoT small data container IE is zero, forward the value of Data type field and the content of the CIoT small data container IE to the to the location services application; or

ii) otherwise forward the value of Data type field and the content of the CIoT small data container IE to the LMF associated with the routing information that is included in the additional information field of the CIoT small data container IE; or

NOTE 1: If the AMF determines there is no pending data or signalling for the UE, the AMF provides an indication of control plane CIoT 5GS Optimisation to the LMF as specified in 3GPP TS 29.518 [20B].

b) otherwise, the AMF shall decipher the value part of NAS message container IE and:

1) if the Payload container IE is included in the CONTROL PLANE SERVICE REQUEST message and if the Payload container type IE is set to "CIoT user data container", the AMF shall look up a PDU session routing context for the UE and the PDU session ID, and forward the content of the Payload container IE to the SMF associated with the UE;

2) if the Payload container IE is included in the CONTROL PLANE SERVICE REQUEST message and if the Payload container type IE is set to "SMS", the AMF shall forward the content of the Payload container IE to the SMSF associated with the UE;

3) if the PDU session status IE is included in the CONTROL PLANE SERVICE REQUEST message or the AMF needs to perform a PDU session status synchronization, the AMF shall include a PDU session status IE in the SERVICE ACCEPT message to indicate which PDU sessions associated with the access type the SERVICE ACCEPT message is sent over are active in the AMF;

4) if the Uplink data status IE is included in the CONTROL PLANE SERVICE REQUEST message and the UE is:

i) not in NB-N1 mode; or

ii) in NB-N1 mode and the UE does not indicate a request to have user-plane resources established for a number of PDU sessions that exceeds the UE's maximum number of supported user-plane resources;

 the AMF shall:

i) indicate the SMF to re-establish the user-plane resources for the corresponding PDU sessions; and

ii) include the PDU session reactivation result IE in the SERVICE ACCEPT message to indicate the user-plane resources re-establishment result of the PDU sessions for which the UE requested to re-establish the user-plane resources;

5) if the Uplink data status IE is included in the CONTROL PLANE SERVICE REQUEST, the UE is in NB-N1 mode, and the UE indicates a request to have user-plane resources established for a number of PDU sessions that exceeds the UE's maximum number of supported user-plane resources, the AMF shall not indicate to the SMF to re-establish the user-plane resources for the corresponding PDU sessions; or

6) otherwise, if the Payload container IE is included in the message and if the Payload container type IE is set to "Location services message container", the AMF shall forward the Payload container type and the content of the Payload container IE to the LMF associated with the routing information included in the Additional information IE of the CONTROL PLANE SERVICE REQUEST message.

NOTE 2: If the AMF determines there is no pending data or signalling for the UE, the AMF provides an indication of control plane CIoT 5GS Optimisation to the LMF as specified in 3GPP TS 29.518 [20B].

For case k) in subclause 5.6.1.1, if the Uplink data status IE is included in the CONTROL PLANE SERVICE REQUEST message and the UE is:

a) not in NB-N1 mode; or

b) in NB-N1 mode and the UE does not indicate a request to have user-plane resources established for a number of PDU sessions that exceeds the UE's maximum number of supported user-plane resources,

the AMF shall:

a) indicate the SMF to re-establish the user-plane resources for the corresponding PDU sessions; and

b) include the PDU session reactivation result IE in the SERVICE ACCEPT message to indicate the user-plane resources re-establishment result of the PDU sessions for which the UE requested to re-establish the user-plane resources.

If the Allowed PDU session status IE is included in the CONTROL PLANE SERVICE REQUEST message, the AMF shall:

a) for a 5GSM message from each SMF that has indicated pending downlink signalling only, forward the received 5GSM message via 3GPP access to the UE after the SERVICE ACCEPT message is sent;

b) for each SMF that has indicated pending downlink data only:

1) notify the SMF that reactivation of the user-plane resources for the corresponding PDU session(s) associated with non-3GPP access cannot be performed if the corresponding PDU session ID(s) are not indicated in the Allowed PDU session status IE; and

2) notify the SMF that reactivation of the user-plane resources for the corresponding PDU session(s) associated with non-3GPP access can be performed if:

i) for a UE not in NB-N1 mode, the corresponding PDU session ID(s) are indicated in the Allowed PDU session status IE; or

ii) for a UE in NB-N1 mode, the corresponding PDU session ID(s) are indicated in the Allowed PDU session status IE and the resulting number of PDU sessions with established user-plane resources does not exceed the UE's maximum number of supported user-plane resources;

c) for each SMF that have indicated pending downlink signalling and data:

1) notify the SMF that reactivation of the user-plane resources for the corresponding PDU session(s) associated with non-3GPP access cannot be performed if the corresponding PDU session ID(s) are not indicated in the Allowed PDU session status IE;

2) notify the SMF that reactivation of the user-plane resources for the corresponding PDU session(s) associated with non-3GPP access can be performed if:

i) for a UE not in NB-N1 mode, the corresponding PDU session ID(s) are indicated in the Allowed PDU session status IE; or

ii) for a UE in NB-N1 mode, the corresponding PDU session ID(s) are indicated in the Allowed PDU session status IE and the resulting number of PDU sessions with established user-plane resources does not exceed the UE's maximum number of supported user-plane resources; and

3) discard the received 5GSM message for PDU session(s) associated with non-3GPP access; and

d) include the PDU session reactivation result IE in the SERVICE ACCEPT message to indicate the successfully re-established user-plane resources for the corresponding PDU sessions, if any.

If the DDX field in the CIoT small data container IE or the DDX field of the Release assistance indication IE indicates:

1) "No further uplink and no further downlink data transmission subsequent to the uplink data transmission is expected" and if there is no downlink signalling or downlink data for the UE; or

2) "Only a single downlink data transmission and no further uplink data transmission subsequent to the uplink data transmission is expected" and upon subsequent delivery of the next received downlink data transmission to the UE and if there is no additional downlink signalling or downlink data for the UE,

the AMF initiates the release of the N1 NAS signalling connection (see 3GPP TS 23.502 [9]).

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

For cases m and n in subclause 5.6.1.1 when the UE supporting MUSIM sets the Request type to "NAS signalling connection release requested" or to "Rejection of paging requested" in the UE request type IE in the CONTROL PLANE SERVICE REQUEST message and if the UE requests restriction of paging by including the Paging restriction IE, the AMF shall store the paging restriction preferences of the UE and enforce these restrictions in the paging procedure as described in clause 5.6.2. The AMF shall send a SERVICE ACCEPT message and initiate the release of the N1 NAS signalling connection as follows:

- for case m in subclause 5.6.1.1, after the completion of the service request procedure;

- for case n in subclause 5.6.1.1, after the completion of the generic UE configuration update procedure that is triggered after the completion of the service request procedure.

Upon successful completion of the procedure, the UE shall reset the service request attempt counter, stop the timer T3517 and enter the state 5GMM-REGISTERED.

If the PDU session status information element is included in the CONTROL PLANE SERVICE REQUEST message, then the AMF:

a) shall perform a local release of all those PDU sessions which are not in 5GSM state PDU SESSION INACTIVE on the AMF side associated with the access type the CONTROL PLANE SERVICE REQUEST message is sent over, but are indicated by the UE as being inactive, and

b) request the SMF to perform a local release of all those PDU sessions.

If the PDU session status information element is included in the SERVICE ACCEPT message, then the UE shall perform a local release of all those PDU sessions which are not in 5GSM state PDU SESSION INACTIVE or PDU SESSION ACTIVE PENDING on the UE side associated with the 3GPP access but are indicated by the AMF as being inactive.

If the user-plane resources cannot be established for a PDU session, the AMF shall include the PDU session reactivation result IE in the SERVICE ACCEPT message indicating that user-plane resources for the corresponding PDU session cannot be re-established, and:

a) if the user-plane resources cannot be established because the SMF indicated to the AMF that the UE is located out of the LADN service area (see 3GPP TS 29.502 [20A]), the AMF shall include the PDU session reactivation result error cause IE with the 5GMM cause set to #43 "LADN not available";

b) if the user-plane resources cannot be established because the SMF indicated to the AMF that only prioritized services are allowed (see 3GPP TS 29.502 [20A]), the AMF shall include the PDU session reactivation result error cause IE with the 5GMM cause set to #28 "restricted service area"; or

c) if the user-plane resources cannot be established because:

1) the SMF indicated to the AMF that the resource is not available in the UPF (see 3GPP TS 29.502 [20A]); or

2) the UE is in NB-N1 mode and the result will lead to user-plane resources established for more than two PDU sessions (see 3GPP TS 23.502 [9])

 the AMF shall include the PDU session reactivation result error cause IE with the 5GMM cause set to #92"insufficient user-plane resources for the PDU session":

NOTE 3: For a UE that is not in NB-N1 mode, it is up to UE implementation when to re-send a request for user-plane re-establishment for the associated PDU session after receiving a PDU session reactivation result error cause IE with a 5GMM cause set to #92 "insufficient user-plane resources for the PDU session".

For case d) in subclause 5.6.1.1, the UE shall also treat the indication from the lower layers that the RRC connection has been released as successful completion of the procedure. The UE shall reset the service request attempt counter, stop the timer T3517 and enter the state 5GMM-REGISTERED.

Upon receipt of the CONTROL PLANE SERVICE REQUEST message with uplink data:

- if the DDX field of the Release assistance indication IE or the DDX field of the CIoT small data container IE is set to "No further uplink and no further downlink data transmission subsequent to the uplink data transmission is expected" in the message;

- if the AMF decides to forward the uplink data piggybacked in the CONTROL PLANE SERVICE REQUEST message; and

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

then the AMF shall send SERVICE ACCEPT message with the T3448 value IE included.

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

If the T3448 value IE is present in the received SERVICE ACCEPT message and the value indicates that this timer is neither zero nor deactivated, the UE shall:

a) stop timer T3448 if it is running;

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

c) start timer T3448 with the value provided in the T3448 value IE.

If the UE is using 5GS services with control plane CIoT 5GS optimization, the T3448 value IE is present in the SERVICE ACCEPT message and the value indicates that this timer is either zero or deactivated, the UE shall ignore the T3448 value IE and proceed as if the T3448 value IE was not present.

If the UE in 5GMM-IDLE mode initiated the service request procedure by sending a CONTROL PLANE SERVICE REQUEST message and the SERVICE ACCEPT message does not include the T3448 value IE and if timer T3448 is running, then the UE shall stop timer T3448.

For case h) in subclause 5.6.1.1,

a) the UE shall treat the indication from the lower layers when the UE has changed to S1 mode as successful completion of the procedure and stop timer T3517;

b) if a UE operating in single-registration mode has changed to S1 mode, it shall disable the N1 mode capability for 3GPP access (see subclause 4.9.2); and

c) the AMF shall not check for CAG restrictions.

If the CONTROL PLANE SERVICE REQUEST message is for emergency services fallback, the AMF triggers the emergency services fallback procedure as specified in subclause 4.13.4.2 of 3GPP TS 23.502 [9].

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

### 8.2.16 Service request

#### 8.2.16.1 Message definition

The SERVICE REQUEST message is sent by the UE to the AMF in order to request the establishment of an N1 NAS signalling connection and/or to request the establishment of user-plane resources for PDU sessions which are established without user-plane resources. See table 8.2.16.1.1.

Message type: SERVICE REQUEST

Significance: dual

Direction: UE to network

Table 8.2.16.1.1: SERVICE REQUEST message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator9.2 | M | V | 1 |
|  | Security header type | Security header type9.3 | M | V | 1/2 |
|  | Spare half octet | Spare half octet9.5 | M | V | 1/2 |
|  | Service request message identity | Message type9.7 | M | V | 1 |
|  | ngKSI  | NAS key set identifier9.11.3.32 | M | V | 1/2 |
|  | Service type | Service type9.11.3.50 | M | V | 1/2 |
|  | 5G-S-TMSI | 5GS mobile identity9.11.3.4 | M | LV-E | 9 |
| 40 | Uplink data status | Uplink data status9.11.3.57 | O | TLV | 4-34 |
| 50 | PDU session status | PDU session status9.11.3.44 | O | TLV | 4-34 |
| 25 | Allowed PDU session status | Allowed PDU session status9.11.3.13 | O | TLV | 4-34 |
| 71 | NAS message container | NAS message container9.11.3.33 | O | TLV-E | 4-n |
| XY | UE request type | UE request type9.11.3.XX | O | TLV | 3 |
| AB | Paging restriction | Paging restriction9.11.3.YY | O | TLV | 3-35 |

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

#### 8.2.16.X UE request type

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

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

#### 8.2.16.Y Paging restriction

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

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

### 8.2.30 Control Plane Service request

#### 8.2.30.1 Message definition

The CONTROL PLANE SERVICE REQUEST message is sent by the UE to the AMF when the UE is using 5GS services with control plane CIoT 5GS optimization. See table 8.2.30.1.1.

Message type: CONTROL PLANE SERVICE REQUEST

Significance: dual

Direction: UE to network

Table 8.2.30.1.1: CONTROL PLANE SERVICE REQUEST message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator9.2 | M | V | 1 |
|  | Security header type | Security header type9.3 | M | V | 1/2 |
|  | Spare half octet | Spare half octet9.5 | M | V | 1/2 |
|  | Control plane service request message identity | Message type9.7 | M | V | 1 |
|  | Control plane service type | Control plane service type9.11.3.18D | M | V | 1/2 |
|  | ngKSI  | NAS key set identifier9.11.3.32 | M | V | 1/2 |
| 6F | CIoT small data container | CIoT small data container 9.11.3.18B | O | TLV | 4-257 |
| 8- | Payload container type | Payload container type9.11.3.40 | O | TV | 1 |
| 7B | Payload container | Payload container9.11.3.39 | O | TLV-E | 4-65538 |
| 12 | PDU session ID | PDU session identity 29.11.3.41 | C | TV | 2 |
| 50 | PDU session status | PDU session status9.11.3.44 | O | TLV | 4-34 |
| F- | Release assistance indication | Release assistance indication9.11.3.46A | O | TV | 1 |
| 40 | Uplink data status | Uplink data status9.11.3.57 | O | TLV | 4-34 |
| 71 | NAS message container | NAS message container9.11.3.33 | O | TLV-E | 4-n |
| 24 | Additional information | Additional information9.11.2.1 | O | TLV | 3-n |
| 25 | Allowed PDU session status | Allowed PDU session status9.11.3.13 | O | TLV | 4-34 |
| XY | UE request type | UE request type9.11.3.XX | O | TLV | 3 |
| AB | Paging restriction | Paging restriction9.11.3.YY | O | TLV | 3-35 |

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

#### 8.2.16.X UE request type

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

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

#### 8.2.16.Y Paging restriction

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

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

#### 9.11.3.XX UE request type

See subclause 9.9.3.XX in 3GPP TS 24.301 [15].

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

#### 9.11.3.YY Paging restriction

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

The Paging restriction information element is coded as shown in figure 9.11.3.YY.1, figure 9.11.3.YY.2 and table 9.11.3.YY.1.

The Paging restriction is a type 4 information element with a minimum length of 3 octets and a maximum length of 35 octets.

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

Figure 9.11.3.YY.1: Paging restriction information element for Paging restriction type = "All paging is restricted" and for Paging restriction type = "All paging is restricted except voice"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Paging restriction IEI | octet 1 |
| Length of Paging restriction contents | octet 2 |
| 0 Spare | 0 Spare | 0 Spare | 0 Spare | Paging restriction type | octet 3 |
| PSI (7) | PSI (6) | PSI (5) | PSI (4) | PSI (3) | PSI (2) | PSI (1) | PSI(0) | octet 4\* |
| PSI (15) | PSI (14) | PSI (13) | PSI (12) | PSI (11) | PSI (10) | PSI (9) | PSI (8) | octet 5\* |
| 0 0 0 0 0 0 0 0 spare | octet 6\*-35\* |

Figure 9.11.3.YY.2: Paging restriction information element for Paging restriction type = "All paging is restricted except for specified PDU session(s)" for Paging restriction type = "All paging is restricted except for voice service and specified PDU session(s)"

Table 9.11.3.YY.1: Paging restriction information element

|  |
| --- |
| Paging restriction type (bits 4 to 1 of octet 3) |
| Bits |
| 4 | 3 | 2 | 1 |  |
| 0 | 0 | 0 | 0 | reserved |
| 0 | 0 | 0 | 1 | All paging is restricted |
| 0 | 0 | 1 | 0 | All paging is restricted except for voice service |
| 0 | 0 | 1 | 1 | All paging is restricted except for specified PDU session(s) |
| 0 | 1 | 0 | 0 | All paging is restricted except for voice service and specified PDU session(s) |
|  |
| All other values are reserved. |
| Bits 5 to 8 of octet 3 are spare and shall be coded as zero.PSI(x) (bits 8 to 1 of octet 4 and octet 5):This field indicates the PDU session identity of the PDU session for which paging is restricted.PSI(0): (bit 1 of octet 4)Spare and shall be coded as zero.PSI(1) – PSI(15):0 indicates that paging is restricted for the PDU session associated with the PDU session identity.1 indicates that paging is not restricted for the PDU session associated with the PDU session identity. |
| All bits in octet 6 to 35 are spare and shall be coded as zero, if the respective octet is included in the information element. |

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