**3GPP TSG-CT WG1 Meeting #123-eC1-20xxxx**

**Electronic meeting, 16-24 April 2020**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
|  |
|  | **24.501** | **CR** | **1833** | **rev** | **2** | **Current version:** | **16.4.1** |  |
|  |
| *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 |  | Radio Access Network |  | Core Network | **x** |

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| ***Title:***  | PDU session release for an inactive UE with RAN paging failure |
|  |  |
| ***Source to WG:*** | Nokia, Nokia Shanghai Bell |
| ***Source to TSG:*** | C1 |
|  |  |
| ***Work item code:*** | 5GProtoc16 |  | ***Date:*** | 2020-04-17 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-16 |
|  | *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-12 (Release 12)**Rel-13 (Release 13)Rel-14 (Release 14)Rel-15 (Release 15)Rel-16 (Release 16)* |
|  |  |
| ***Reason for change:*** | CT4 agreed a CR (C4-195487) to 3GPP TS 29.518, in which the AMF is enabled to send a *N1N2Transfer Failure Notification* to the SMF when it cannot deliver the PDU SESSION RELEASE COMMAND message to the UE, like specified when the AMF cannot deliver a NAS SMS to a UE in RRC inactive state when the RAN paging fails. Quotes from TS 29.518:<snip>***Figure 5.2.2.3.2-1 N1N2Transfer Failure Notification for UE related signalling****1. When the AMF determines that the paging or NAS Notification has failed, or that the indicated non-3GPP PDU session is not allowed to move to 3GPP access, or that the delivery of the N1 message fails e.g. in case the UE is in RRC Inactive and NG-RAN paging was not successful, and if the NF service consumer had provided a notification URI (see clause 5.2.2.3.1.2), the AMF shall send a POST request to the NF Service Consumer on that Notification URI. The AMF shall include the N1N2MessageTransfer request resource URI returned earlier (see clause 5.2.2.3.1.2) in the POST request body. The AMF shall also include a N1/N2 message transfer cause information in the POST request body and set the value as specified in clause 6.1.5.6.3.1.*<snap><snip>*Table 6.1.6.3.6-1: Enumeration N1N2MessageTransferCause*

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| *Enumeration value* | *Description* |
| *"ATTEMPTING\_TO\_REACH\_UE"* | *This cause code represents the case where the AMF has initiated paging to reach the UE in order to deliver the N1 message.* |
| *"N1\_N2\_TRANSFER\_INITIATED"* | *This cause code represents the case where the AMF has initiated the N1/N2 message transfer towards the UE and/or the AN.* |
| *"WAITING\_FOR\_ASYNCHRONOUS\_TRANSFER"* | *This cause code represents the case where the AMF has stored the N1/N2 message due to Asynchronous Transfer.* |
| *"UE\_NOT\_RESPONDING"* | *This cause code represents the case that the AMF has initiated paging to reach the UE but the UE is not responding to the paging, or the case of a UE in RRC Inactive state when NG-RAN paging is not successful (e.g. NG-RAN initiated a UE context release with a cause indicating the non-delivery of the N1 message).* |
| *"N1\_MSG\_NOT\_TRANSFERRED"* | *This cause code represents the case where the AMF has skipped sending N1 message to the UE, when UE is in CM-IDLE and the "skipInd" is set to "true" in the request.* |
| *"UE\_NOT\_REACHABLE\_FOR\_SESSION"* | *This cause code indicates that the UE is not reachable for the non-3GPP PDU session, due to the UE being in CM-IDLE for non-3GPP access and the PDU session is not allowed to move to 3GPP access.* |
| *"TEMPORARY\_REJECT\_REGISTRATION\_ONGOING"* | *This cause code represents the case that the AMF has initiated paging to reach the UE but there is an ongoing registration procedure.* |
| *"TEMPORARY\_REJECT\_HANDOVER\_ONGOING"* | *This cause code represents the case that the AMF has initiated paging to reach the UE but there is an ongoing Xn or N2 handover procedure.* |

<snap>When the RAN paging fails, the SMF will receive a (successful) NGAP PDU Session Resource Release Response via an SmContextUpdate Request and, according to the CR, the AMF notifies the SMF that the NAS PDU was not delivered to the UE.Based on the currently defined behaviour of 5GSM sublayer, the SMF would then retry sending the NAS PDU (upon NAS timer expiry), and if UE context has already been released, the AMF would page UE unnecessarily. |
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| ***Summary of change:*** | The 5GSM sublayer of the SMF receiving the notification from the AMF stops retransmission of the PDU SESSION RELEASE COMMAND message. |
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| ***Consequences if not approved:*** | SMF will retry sending the NAS PDU, causing unncessary paging. |
|  |  |
| ***Clauses affected:*** | 2, 6.3.3.5 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
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| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document in the same Release as the present document.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[1A] 3GPP TS 22.011: "Service accessibility".

[2] 3GPP TS 22.101: "Service aspects; Service principles".

[3] 3GPP TS 22.261: "Service requirements for the 5G system; Stage 1".

[4] 3GPP TS 23.003: "Numbering, addressing and identification".

[4A] 3GPP TS 23.040: "Technical realization of Short Message Service (SMS)".

[5] 3GPP TS 23.122: "Non-Access-Stratum functions related to Mobile Station (MS) in idle mode".

[6] 3GPP TS 23.167: "IP Multimedia Subsystem (IMS) emergency sessions".

[6A] 3GPP TS 23.216: "Single Radio Voice Call Continuity (SRVCC); Stage 2".

[6B] 3GPP TS 23.273: "5G System (5GS) Location Services (LCS); Stage 2".

[6C] 3GPP TS 23.287: "Architecture enhancements for 5G System (5GS) to support Vehicle-to-Everything (V2X) services".

[6D] 3GPP TS 23.316: "Wireless and wireline convergence access support for the 5G System (5GS)".

[7] 3GPP TS 23.401: "GPRS enhancements for E-UTRAN access".

[8] 3GPP TS 23.501: "System Architecture for the 5G System; Stage 2".

[9] 3GPP TS 23.502: "Procedures for the 5G System; Stage 2".

[10] 3GPP TS 23.503: "Policy and Charging Control Framework for the 5G System; Stage 2".

[11] 3GPP TS 24.007: "Mobile radio interface signalling layer 3; General aspects".

[12] 3GPP TS 24.008: "Mobile Radio Interface Layer 3 specification; Core Network Protocols; Stage 3".

[13] 3GPP TS 24.011: "Point-to-Point Short Message Service (SMS) support on mobile radio interface".

[13A] 3GPP TS 24.080: "Mobile radio interface layer 3 Supplementary services specification; Formats and coding".

[13B] 3GPP TS 24.193: "Access Traffic Steering, Switching and Splitting; Stage 3".

[14] 3GPP TS 24.229: "IP multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Stage 3".

[14A] 3GPP TS 24.250: "Protocol for Reliable Data Service; Stage 3".

[15] 3GPP TS 24.301: "Non-Access-Stratum (NAS) protocol for Evolved Packet System (EPS); Stage 3".

[16] 3GPP TS 24.302: "Access to the 3GPP Evolved Packet Core (EPC) via non-3GPP access networks; Stage 3"

[17] 3GPP TS 24.368: "Non-Access Stratum (NAS) configuration Management Object (MO)".

[18] 3GPP TS 24.502: "Access to the 3GPP 5G System (5GS) via non-3GPP access networks; Stage 3".

[19] 3GPP TS 24.526: "UE policies for 5G System (5GS); Stage 3".

[19A] 3GPP TS 24.535: "Device-Side Time-Sensitive Networking (TSN) Translator (DS-TT) to Network-Side TSN Translator (NW-TT) protocol aspects; Stage 3".

[19B] 3GPP TS 24.587: "Vehicle-to-Everything (V2X) services in 5G System (5GS); Protocol aspects; Stage 3"

[19C] 3GPP TS 24.588: "Vehicle-to-Everything (V2X) services in 5G System (5GS); User Equipment (UE) policies; Stage 3"

[19D] 3GPP TS 24.5xy: "Time-Sensitive Networking (TSN) Application Function (AF) to Device-Side TSN Translator (DS-TT) and Network-Side TSN Translator (NW-TT) protocol aspects; Stage 3".

[20] 3GPP TS 24.623: "Extensive Markup Language (XML) Configuration Access Protocol (XCAP) over the Ut interface for Manipulating Supplementary Services".

[20A] 3GPP TS 29.502: "5G System; Session Management Services; Stage 3".

[20X] 3GPP TS 29.518: "5G System; Access and Mobility Management Services; Stage 3".

 [21] 3GPP TS 29.525: "5G System; UE Policy Control Service; Stage 3".

[22] 3GPP TS 31.102: "Characteristics of the Universal Subscriber Identity Module (USIM) application".

[22A] 3GPP TS 31.111: "USIM Application Toolkit (USAT)".

[22B] 3GPP TS 31.115: "Secured packet structure for (Universal) Subscriber Identity Module (U)SIM Toolkit applications".

[23] 3GPP TS 33.102: "3G security; Security architecture".

[23A] 3GPP TS 33.401: "3GPP System Architecture Evolution; Security architecture".

[24] 3GPP TS 33.501: "Security architecture and procedures for 5G System".

[25] 3GPP TS 36.323: "NR; Packet Data Convergence Protocol (PDCP) specification".

[25A] 3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Resource Control (RRC) protocol specification".

[25B] 3GPP TS 36.300: "Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Overall description".

[25C] 3GPP TS 36.304: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) procedures in idle mode".

[25D] 3GPP TS 36.306: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio access capabilities".

[25E] 3GPP TS 36.321: "Evolved Universal Terrestrial Radio Access (E-UTRA); Medium Access Control (MAC) protocol specification".

[26] 3GPP TS 36.355: "Evolved Universal Terrestrial Radio Access (E-UTRA); LTE Positioning Protocol (LPP)".

[27] 3GPP TS 38.300: "NR; NR and NG-RAN Overall Description; Stage 2".

[28] 3GPP TS 38.304: "New Generation Radio Access Network; User Equipment (UE) procedures in Idle mode".

[29] 3GPP TS 38.323: "Evolved Universal Terrestrial Radio Access (E-UTRA); Packet Data Convergence Protocol (PDCP) specification".

[30] 3GPP TS 38.331: "NR; Radio Resource Control (RRC); Protocol Specification".

[31] 3GPP TS 38.413: "NG Radio Access Network (NG-RAN); NG Application Protocol (NGAP)".

[31A] IEEE Std 802.3™-2018: "Ethernet".

[32] IETF RFC 768: "User Datagram Protocol".

[33] IETF RFC 793: "Transmission Control Protocol."

[33A] IETF RFC 3095: "RObust Header Compression (ROHC): Framework and four profiles: RTP, UDP, ESP and uncompressed".

[33B] IETF RFC 3315: "Dynamic Host Configuration Protocol for IPv6 (DHCPv6)".

[33C] IETF RFC 3633: "IPv6 Prefix Options for Dynamic Host Configuration Protocol (DHCP) version 6".

[34] IETF RFC 3748: "Extensible Authentication Protocol (EAP)".

[34A] IETF RFC 3843: "RObust Header Compression (ROHC): A Compression Profile for IP".

[35] IETF RFC 3736: "Stateless Dynamic Host Configuration Protocol (DHCP) Service for IPv6"

[35A] IETF RFC 4122: "A Universally Unique IDentifier (UUID) URN Namespace".

[36] IETF RFC 4191: "Default Router Preferences and More-Specific Routes".

[37] IETF RFC 7542: "The Network Access Identifier".

[38] IETF RFC 4303: "IP Encapsulating Security Payload (ESP)".

[38A] IETF RFC 4815: "RObust Header Compression (ROHC): Corrections and Clarifications to RFC 3095".

[38B] IETF RFC 4861: "Neighbor Discovery for IP version 6 (IPv6)".

[39] IETF RFC 4862: "IPv6 Stateless Address Autoconfiguration".

[39A] IETF RFC 5225: "RObust Header Compression (ROHC) Version 2: Profiles for RTP, UDP, IP, ESP and UDP Lite".

[39B] IETF RFC 5795: "The RObust Header Compression (ROHC) Framework".

[40] IETF RFC 5448: "Improved Extensible Authentication Protocol Method for 3rd Generation Authentication and Key Agreement (EAP-AKA')".

[40A] IETF RFC 6603: "Prefix Exclude Option for DHCPv6-based Prefix Delegation".

[40B] IETF RFC 6846: "RObust Header Compression (ROHC): A Profile for TCP/IP (ROHC-TCP)".

[41] IETF RFC 7296: "Internet Key Exchange Protocol Version 2 (IKEv2)".

[42] ITU-T Recommendation E.212: "The international identification plan for public networks and subscriptions", 2016-09-23.

[43] IEEE Std 802-2014: "IEEE Standard for Local and Metropolitan Area Networks: Overview and Architecture" (30 June 2014).

[43A] IEEE Std 802.1AS-Rev/D7.3, August 2018: "IEEE Standard for Local and metropolitan area networks--Timing and Synchronization for Time-Sensitive Applications".

[43B] IEEE 1588™-2008: "IEEE Standard for a Precision Clock Synchronization Protocol for Networked Measurement and Control Systems".

[43C] Void.

[43D] Void.

[43E] Void.

[44] Void.

[45] Void.

[46] Void.

[47] Void.

[48] IEEE "Guidelines for Use of Extended Unique Identifier (EUI), Organizationally Unique Identifier (OUI), and Company ID (CID)".

[49] BBF TR-069: "CPE WAN Management Protocol".

[50] BBF TR-369: "User Services Platform (USP)".

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

#### 6.3.3.5 Abnormal cases on the network side

The following abnormal cases can be identified:

a) Expiry of timer T3592.

 The SMF shall, on the first expiry of the timer T3592, retransmit the PDU SESSION RELEASE COMMAND message and shall reset and start timer T3592. This retransmission is repeated four times, i.e. on the fifth expiry of timer T3592, the SMF shall abort the procedure.

b) Collision of network-requested PDU session release procedure and UE-requested PDU session modification procedure.

 When the SMF receives a PDU SESSION MODIFICATION REQUEST message during the network-requested PDU session release procedure, and the PDU session indicated in PDU SESSION MODIFICATION REQUEST message is the PDU session that the SMF had requested to release, the SMF shall ignore the PDU SESSION MODIFICATION REQUEST message and proceed with the PDU session release procedure.

c) Collision of network-requested PDU session release procedure and UE-requested PDU session release procedure.

 If the SMF receives a PDU SESSION RELEASE REQUEST message after sending a PDU SESSION RELEASE COMMAND message to the UE, and the PDU session ID in the PDU SESSION RELEASE REQUEST message is the same as the PDU session ID in the PDU SESSION RELEASE COMMAND message, the SMF shall ignore the PDU SESSION RELEASE REQUEST message and proceed with the network-requested PDU session release procedure.

x) UE not responding due to unsuccessful NG-RAN paging.

 If the SMF determines based on content of the n2SmInfo attribute specified in 3GPP TS 29.502 [20A]) and an N1/N2 message transfer cause specified in 3GPP TS 29.518 [20X] that the DL NAS TRANSPORT message carrying the PDU SESSION RELEASE COMMAND message was not forwarded to the UE by the NG-RAN due to unsuccessful NG-RAN paging, then the SMF shall abort the procedure and shall release locally the PDU session.