**3GPP TSG-RAN WG3 Meeting #112e *R3-212892***

**Online, 17th – 27th May 2021**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **00** | **CR** |  | **rev** |  | **CR** |  |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network | **X** | Core Network |  |

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|  | | | | | | | | | | |
| ***Title:*** | NAS PDU handling | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Ericsson | | | | | | | | | |
| ***Source to TSG:*** | RAN3 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | TEI16 | | | | |  | ***Date:*** | | | 2021-05-06 |
|  |  | | | |  | |  | | |  |
| ***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 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)* | |
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| ***Reason for change:*** | | The NAS non delivery procedure is generalized. | | | | | | | | |
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| ***Summary of change:*** | | Clarify the NG-RAN node triggers NAS non-delivery procedure to report the non-delivery of any non PDU Session related NAS PDU received from the AMF.  Impact assessment:  The CR has limited impact to the specification. | | | | | | | | |
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| ***Consequences if not approved:*** | | Unclear specification | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 7.6, 9.2.2.1 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR … CR… | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

## 7.6 Transport of NAS Messages

NR provides reliable in-sequence delivery of NAS messages over SRBs in RRC, except at handover where losses or duplication can occur when PDCP is re-established. In RRC, NAS messages are sent in transparent containers. Piggybacking of NAS messages can occur in the following scenarios:

- At bearer establishment/modification/release in the DL;

- For transferring the initial NAS message during connection setup and connection resume in the UL.

NOTE: In addition to the integrity protection and ciphering performed by NAS, NAS messages can also be integrity protected and ciphered by PDCP.

Multiple NAS messages can be sent in a single downlink RRC message during PDU Session Resource establishment or modification. In this case, the order of the NAS messages contained in the RRC message shall be in the same order as that in the corresponding NG-AP message in order to ensure the in-sequence delivery of NAS messages.

NG-RAN node triggers the NAS Non Delivery Indication procedure to report the non-delivery of any non PDU Session related NAS PDU received from the AMF.

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### 9.2.2 Mobility in RRC\_INACTIVE

#### 9.2.2.1 Overview

RRC\_INACTIVE is a state where a UE remains in CM-CONNECTED and can move within an area configured by NG-RAN (the RNA) without notifying NG-RAN. In RRC\_INACTIVE, the last serving gNB node keeps the UE context and the UE-associated NG connection with the serving AMF and UPF.

If the last serving gNB receives DL data from the UPF or DL UE-associated signalling from the AMF (except the UE Context Release Command message) while the UE is in RRC\_INACTIVE, it pages in the cells corresponding to the RNA and may send XnAP RAN Paging to neighbour gNB(s) if the RNA includes cells of neighbour gNB(s).

Upon receiving the UE Context Release Command message while the UE is in RRC\_INACTIVE, the last serving gNB may page in the cells corresponding to the RNA and may send XnAP RAN Paging to neighbour gNB(s) if the RNA includes cells of neighbour gNB(s), in order to release UE explicitly.

Upon receiving the NG RESET message while the UE is in RRC\_INACTIVE, the last serving gNB may page involved UEs in the cells corresponding to the RNA and may send XnAP RAN Paging to neighbour gNB(s) if the RNA includes cells of neighbour gNB(s) in order to explicitly release involved UEs.

Upon RAN paging failure, the gNB behaves according to TS 23.501 [3].

The AMF provides to the NG-RAN node the Core Network Assistance Information to assist the NG-RAN node's decision whether the UE can be sent to RRC\_INACTIVE. The Core Network Assistance Information includes the registration area configured for the UE, the Periodic Registration Update timer, and the UE Identity Index value, and may include the UE specific DRX, an indication if the UE is configured with Mobile Initiated Connection Only (MICO) mode by the AMF, and the Expected UE Behaviour. The UE registration area is taken into account by the NG-RAN node when configuring the RNA. The UE specific DRX and UE Identity Index value are used by the NG-RAN node for RAN paging. The Periodic Registration Update timer is taken into account by the NG-RAN node to configure Periodic RNA Update timer. The NG-RAN node takes into account the Expected UE Behaviour to assist the UE RRC state transition decision.

At transition to RRC\_INACTIVE the NG-RAN node may configure the UE with a periodic RNA Update timer value. At periodic RNA Update timer expiry without notification from the UE, the gNB behaves as specified in TS 23.501 [3].

If the UE accesses a gNB other than the last serving gNB, the receiving gNB triggers the XnAP Retrieve UE Context procedure to get the UE context from the last serving gNB and may also trigger an Xn-U Address Indication procedure including tunnel information for potential recovery of data from the last serving gNB. Upon successful UE context retrieval, the receiving gNB shall perform the slice-aware admission control in case of receiving slice information and becomes the serving gNB and it further triggers the NGAP Path Switch Request and applicable RRC procedures. After the path switch procedure, the serving gNB triggers release of the UE context at the last serving gNB by means of the XnAP UE Context Release procedure.

In case the UE is not reachable at the last serving gNB, the gNB shall fail any AMF initiated UE-associated class 1 procedure which allows the signalling of unsuccessful operation in the respective response message. It may trigger the NAS Non Delivery Indication procedure to report the non-delivery of any non PDU Session related NAS PDU received from the AMF.

If the UE accesses a gNB other than the last serving gNB and the receiving gNB does not find a valid UE Context, the receiving gNB can perform establishment of a new RRC connection instead of resumption of the previous RRC connection. UE context retrieval will also fail and hence a new RRC connection needs to be established if the serving AMF changes.

A UE in the RRC\_INACTIVE state is required to initiate RNA update procedure when it moves out of the configured RNA. When receiving RNA update request from the UE, the receiving gNB triggers the XnAP Retrieve UE Context procedure to get the UE context from the last serving gNB and may decide to send the UE back to RRC\_INACTIVE state, move the UE into RRC\_CONNECTED state, or send the UE to RRC\_IDLE. In case of periodic RNA update, if the last serving gNB decides not to relocate the UE context, it fails the Retrieve UE Context procedure and sends the UE back to RRC\_INACTIVE, or to RRC\_IDLE directly by an encapsulated *RRCRelease* message.