**3GPP RAN WG3 Meeting #119bis-eR3-23xxxx**

**Online, 17th – 26th April, 2023**

**Agenda Item: 21.2**

**Source: Ericsson, TBD**

**Title: (TP to TS 38.413 BL CR for RedCap enhancements): Addition of new procedures for CN based MT communication Handling**

**Document for: Other**

Text proposal for TS 38.413

<<<<<<<<<<<<<<<<<<< Changes Begin >>>>>>>>>>>>>>>>>>>>

## 8.1 List of NGAP Elementary Procedures

In the following tables, all EPs are divided into Class 1 and Class 2 EPs (see subclause 3.1 for explanation of the different classes):

**Table 8.1-1: Class 1 procedures**

|  |  |  |  |
| --- | --- | --- | --- |
| **Elementary Procedure** | **Initiating Message** | **Successful Outcome** | **Unsuccessful Outcome** |
| **Response message** | **Response message** |
| AMF Configuration Update | AMF CONFIGURATION UPDATE | AMF CONFIGURATION UPDATE ACKNOWLEDGE | AMF CONFIGURATION UPDATE FAILURE |
| RAN Configuration Update | RAN CONFIGURATION UPDATE | RAN CONFIGURATION UPDATE ACKNOWLEDGE | RAN CONFIGURATION UPDATE FAILURE |
| Handover Cancellation | HANDOVER CANCEL | HANDOVER CANCEL ACKNOWLEDGE |  |
| Handover Preparation | HANDOVER REQUIRED | HANDOVER COMMAND | HANDOVER PREPARATION FAILURE |
| Handover Resource Allocation | HANDOVER REQUEST | HANDOVER REQUEST ACKNOWLEDGE | HANDOVER FAILURE |
| Initial Context Setup | INITIAL CONTEXT SETUP REQUEST | INITIAL CONTEXT SETUP RESPONSE | INITIAL CONTEXT SETUP FAILURE |
| NG Reset | NG RESET | NG RESET ACKNOWLEDGE |  |
| NG Setup | NG SETUP REQUEST | NG SETUP RESPONSE | NG SETUP FAILURE |
| Path Switch Request | PATH SWITCH REQUEST | PATH SWITCH REQUEST ACKNOWLEDGE | PATH SWITCH REQUEST FAILURE |
| PDU Session Resource Modify | PDU SESSION RESOURCE MODIFY REQUEST | PDU SESSION RESOURCE MODIFY RESPONSE |  |
| PDU Session Resource Modify Indication | PDU SESSION RESOURCE MODIFY INDICATION | PDU SESSION RESOURCE MODIFY CONFIRM |  |
| PDU Session Resource Release | PDU SESSION RESOURCE RELEASE COMMAND | PDU SESSION RESOURCE RELEASE RESPONSE |  |
| PDU Session Resource Setup | PDU SESSION RESOURCE SETUP REQUEST | PDU SESSION RESOURCE SETUP RESPONSE |  |
| UE Context Modification | UE CONTEXT MODIFICATION REQUEST | UE CONTEXT MODIFICATION RESPONSE | UE CONTEXT MODIFICATION FAILURE |
| UE Context Release | UE CONTEXT RELEASE COMMAND | UE CONTEXT RELEASE COMPLETE |  |
| Write-Replace Warning  | WRITE-REPLACE WARNING REQUEST | WRITE-REPLACE WARNING RESPONSE |  |
| PWS Cancel | PWS CANCEL REQUEST | PWS CANCEL RESPONSE |  |
| UE Radio Capability Check | UE RADIO CAPABILITY CHECK REQUEST | UE RADIO CAPABILITY CHECK RESPONSE |  |
| UE Context Suspend | UE CONTEXT SUSPEND REQUEST | UE CONTEXT SUSPEND RESPONSE | UE CONTEXT SUSPEND FAILURE |
| UE Context Resume | UE CONTEXT RESUME REQUEST | UE CONTEXT RESUME RESPONSE | UE CONTEXT RESUME FAILURE |
| UE Radio Capability ID Mapping | UE RADIO CAPABILITY ID MAPPING REQUEST | UE RADIO CAPABILITY ID MAPPING RESPONSE |  |
| Broadcast Session Setup | BROADCAST SESSION SETUP REQUEST | BROADCAST SESSION SETUP RESPONSE | BROADCAST SESSION SETUP FAILURE |
| Broadcast Session Modification | BROADCAST SESSION MODIFICATION REQUEST | BROADCAST SESSION MODIFICATION RESPONSE | BROADCAST SESSION MODIFICATION FAILURE |
| Broadcast Session Release | BROADCAST SESSION RELEASE REQUEST | BROADCAST SESSION RELEASE RESPONSE |  |
| Distribution Setup | DISTRIBUTION SETUP REQUEST | DISTRIBUTION SETUP RESPONSE | DISTRIBUTION SETUP FAILURE |
| Distribution Release | DISTRIBUTION RELEASE REQUEST | DISTRIBUTION RELEASE RESPONSE |  |
| Multicast Session Activation | MULTICAST SESSION ACTIVATION REQUEST  | MULTICAST SESSION ACTIVATION RESPONSE | MULTICAST SESSION ACTIVATION FAILURE |
| Multicast Session Deactivation | MULTICAST SESSION DEACTIVATION REQUEST | MULTICAST SESSION DEACTIVATION RESPONSE |  |
| Multicast Session Update | MULTICAST SESSION UPDATE REQUEST | MULTICAST SESSION UPDATE RESPONSE | MULTICAST SESSION UPDATE FAILURE |
| MT Communication Handling | MT COMMUNICATION HANDLING REQUEST | MT COMMUNICATION HANDLING RESPONSE | MT COMMUNICATION HANDLING FAILURE |

**Table 8.1-2: Class 2 procedures**

|  |  |
| --- | --- |
| **Elementary Procedure** | **Message** |
| Downlink RAN Configuration Transfer | DOWNLINK RAN CONFIGURATION TRANSFER |
| Downlink RAN Status Transfer | DOWNLINK RAN STATUS TRANSFER |
| Downlink NAS Transport | DOWNLINK NAS TRANSPORT |
| Error Indication | ERROR INDICATION |
| Uplink RAN Configuration Transfer | UPLINK RAN CONFIGURATION TRANSFER |
| Uplink RAN Status Transfer | UPLINK RAN STATUS TRANSFER |
| Handover Notification | HANDOVER NOTIFY |
| Initial UE Message | INITIAL UE MESSAGE |
| NAS Non Delivery Indication | NAS NON DELIVERY INDICATION |
| Paging | PAGING |
| PDU Session Resource Notify | PDU SESSION RESOURCE NOTIFY |
| Reroute NAS Request | REROUTE NAS REQUEST |
| UE Context Release Request | UE CONTEXT RELEASE REQUEST |
| Uplink NAS Transport | UPLINK NAS TRANSPORT |
| AMF Status Indication | AMF STATUS INDICATION |
| PWS Restart Indication | PWS RESTART INDICATION |
| PWS Failure Indication | PWS FAILURE INDICATION |
| Downlink UE Associated NRPPa Transport | DOWNLINK UE ASSOCIATED NRPPA TRANSPORT |
| Uplink UE Associated NRPPa Transport | UPLINK UE ASSOCIATED NRPPA TRANSPORT |
| Downlink Non UE Associated NRPPa Transport | DOWNLINK NON UE ASSOCIATED NRPPA TRANSPORT |
| Uplink Non UE Associated NRPPa Transport | UPLINK NON UE ASSOCIATED NRPPA TRANSPORT |
| Trace Start | TRACE START |
| Trace Failure Indication | TRACE FAILURE INDICATION |
| Deactivate Trace | DEACTIVATE TRACE |
| Cell Traffic Trace | CELL TRAFFIC TRACE |
| Location Reporting Control | LOCATION REPORTING CONTROL |
| Location Reporting Failure Indication | LOCATION REPORTING FAILURE INDICATION |
| Location Report | LOCATION REPORT |
| UE TNLA Binding Release | UE TNLA BINDING RELEASE REQUEST |
| UE Radio Capability Info Indication | UE RADIO CAPABILITY INFO INDICATION |
| RRC Inactive Transition Report | RRC INACTIVE TRANSITION REPORT |
| Overload Start | OVERLOAD START |
| Overload Stop | OVERLOAD STOP |
| Secondary RAT Data Usage Report | SECONDARY RAT DATA USAGE REPORT |
| Uplink RIM Information Transfer | UPLINK RIM INFORMATION TRANSFER |
| Downlink RIM Information Transfer | DOWNLINK RIM INFORMATION TRANSFER |
| Retrieve UE Information | RETRIEVE UE INFORMATION |
| UE Information Transfer | UE INFORMATION TRANSFER |
| RAN CP Relocation Indication | RAN CP RELOCATION INDICATION |
| Connection Establishment Indication | CONNECTION ESTABLISHMENT INDICATION |
| AMF CP Relocation Indication | AMF CP RELOCATION INDICATION |
| Handover Success | HANDOVER SUCCESS |
| Uplink RAN Early Status Transfer | UPLINK RAN EARLY STATUS TRANSFER |
| Downlink RAN Early Status Transfer | DOWNLINK RAN EARLY STATUS TRANSFER |
| Multicast Group Paging | MULTICAST GROUP PAGING |
| Broadcast Session Release Required | BROADCAST SESSION RELEASE REQUIRED |
| DL MT Data Notification | DL MT DATA NOTIFICATION |

<<<<<<<<<<<<<<<<<<< Next Change >>>>>>>>>>>>>>>>>>>>

8.3.X MT Communication Handling

8.3.X.1 General

The purpose of the MT Communication Handling procedure is to request the AMF to activate the CN based Mobile Terminated Communication handling for a UE in RRC\_INACTIVE state with extended DRX beyond 10.24 seconds as specified in TS 23.501 [9]. The procedure uses UE-associated signalling.

8.3.X.2 Successful Operation



**Figure 8.3.X.2-1: MT Communication Handling procedure. Successful operation.**

The NG-RAN node initiates the procedure by sending the MT COMMUNICATION HANDLING REQUEST message to the AMF.

If the *RRC State* IE is included in the MT COMMUNICATION HANDLING REQUEST message, the AMF shall take appropriate actions as specified in TS 23.502 [10] based on the information indicated by the *RRC State* IE.

If the *NR Paging eDRX Cycle for RRC INACTIVE* IE is included in the MT COMMUNICATION HANDLING REQUEST message, the AMF shall use it to determine when the UE is available for mobile terminating communication according to TS 38.304 [12] and TS 23.501 [9].

*Editor’s Note: FFS on other IEs that need to be included in the Mobile Terminating Communication procedure*.

8.3.X.3 Unsuccessful Operation



**Figure 8.3.X.3-1: MT Communication Handling: unsuccessful operation.**

If the AMF is not able to activate CN based mobile terminating communication handling for the UE configured with eDRX cycle value longer than 10.24 seconds in RRC\_INACTIVE state, it shall send a MT COMMUNICATION HANDLING FAILURE message to the NG-RAN node.

8.3.Y DL MT Data Notification

8.3.Y.1 General

This procedure is initiated by the AMF to indicate the there is MT data or signaling buffered in 5GC for the UE.

The procedure uses UE associated signalling.

8.3.Y.2 Successful Operation



**Figure 8.5.2.2-1: CN Triggered RAN Paging**

The AMF initiates the DL MT Data Notification procedure by sending the DL MT DATA NOTIFICATION message to the NG-RAN node.

At the reception of the DL MT DATA NOTIFICATION message, the NG-RAN node shall perform RAN Paging for the UE in RRC\_INACTIVE state.

If the flowing IEs are included in the CN TRIGGERED RAN PAGING message, the NG-RAN shall, if supported, take them into account when triggering RAN Paging:

*Editor’s Note: FFS on the actual IEs that need to be included in the DL MT Data Notification procedure*. *The paging policy differentiation IEs from the CT4 LS to be taken as basis*

8.5.X.3 Abnormal Conditions

Void.

<<<<<<<<<<<<<<<<<<< Next Change >>>>>>>>>>>>>>>>>>>>

9.2.2.X1 COMMUNICATION HANDLING REQUEST

This message is sent by the NG-RAN node to the AMF to request CN based MT communication handling for UEs in RRC\_INACTIVE state with long eDRX beyond 10.24 seconds as specified in TS 23.501 [9].

Direction: NG-RAN node → AMF

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| Message Type | M |  | 9.3.1.1 |  |
| AMF UE NGAP ID | M |  | 9.3.3.1 |  |
| RAN UE NGAP ID | M |  | 9.3.3.2 |  |
| RRC State | M |  | 9.3.1.92 |  |
| NR Paging eDRX Cycle for RRC INACTIVE | C-ifInactive |  | ENUMERATED (hfquarter, hfhalf, hf1, hf2, hf4, hf8, hf16, hf32, hf64, hf128, hf256, hf512, hf1024, …) |  |
| FFS |  |  |  |  |

|  |  |
| --- | --- |
| **Condition** | **Explanation** |
| ifInactive | This IE shall be present if the *RRC State* IE is set to the value "Inactive ". |

9.2.2.X2 COMMUNICATION HANDLING RESPONSE

This message is sent by the AMF to indicate that CN MT Communication handling was successfully applied.

Direction: NG-RAN node → AMF

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| Message Type | M |  | 9.3.1.1 |  |
| AMF UE NGAP ID | M |  | 9.3.3.1 |  |
| RAN UE NGAP ID | M |  | 9.3.3.2 |  |
| FFS |  |  |  |  |

9.2.2.X3 COMMUNICATION HANDLING FAILURE

This message is sent by the AMF to indicate that CN MT Communication handling was unsuccessful.

Direction: NG-RAN node → AMF

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| Message Type | M |  | 9.3.1.1 |  |
| AMF UE NGAP ID | M |  | 9.3.3.1 |  |
| RAN UE NGAP ID | M |  | 9.3.3.2 |  |
| Cause | M |  | 9.3.1.2 |  |
| Criticality Diagnostics | O |  | 9.3.1.3 |  |

<<<<<<<<<<<<<<<<<<< Next Change >>>>>>>>>>>>>>>>>>>>

9.2.4.X1 DL MT DATA NOTIFICATION

This message is sent by the AMF to indicate there is buffered MT data or signaling for the UE.

Direction: AMF → NG-RAN

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| Message Type | M |  | 9.3.1.1 |  |
| AMF UE NGAP ID | M |  | 9.3.3.1 |  |
| RAN UE NGAP ID | M |  | 9.3.3.2 |  |
| FFS |  |  |  |  |

<<<<<<<<<<<<<<<<<<< Next Change >>>>>>>>>>>>>>>>>>>>

9.3.1.15 Core Network Assistance Information for RRC INACTIVE

This IE provides assistance information for RRC\_INACTIVE configuration.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** | **Criticality** | **Assigned Criticality** |
| UE Identity Index Value | M |  | 9.3.3.23 |  | - |  |
| UE Specific DRX | O |  | Paging DRX9.3.1.90 |  | - |  |
| Periodic Registration Update Timer | M |  | 9.3.3.24 |  | - |  |
| MICO Mode Indication | O |  | 9.3.1.23 |  | - |  |
| **TAI List for RRC Inactive** |  | *1* |  |  | - |  |
| **>TAI List for RRC Inactive Item** |  | *1..<maxnoofTAIforInactive>* |  |  | - |  |
| >>TAI | M |  | 9.3.3.11 |  | - |  |
| Expected UE Behaviour | O |  | 9.3.1.93 |  | - |  |
| E-UTRA Paging eDRX Information | O |  | 9.3.1.154 |  | YES | ignore |
| Extended UE Identity Index Value | O |  | 9.3.3.52 |  | YES | ignore |
| UE Radio Capability for Paging | O |  | 9.3.1.68 |  | YES | ignore |
| MICO All PLMN | O |  | 9.3.1.194 |  | YES | ignore |
| NR Paging eDRX Information | O |  | 9.3.1.227 |  | YES | ignore |
| Paging Cause Indication for Voice Service | O |  | ENUMERATED (supported, …)  | This IE indicates whether the UE supports the feature of indication of paging cause for voice service. | YES | ignore |
| PEIPS Assistance Information | O |  | 9.3.1.232 |  | YES | ignore |
| CN MT communication handling | O |  | ENUMERATED (supported, …) | This IE indicates the CN support of CN MT communication handling | YES | ignore |

|  |  |
| --- | --- |
| **Range bound** | **Explanation** |
| maxnoofTAIforInactive | Maximum no. of TAIs for RRC Inactive. Value is 16. |

<<<<<<<<<<<<<<<<<<< Next Change >>>>>>>>>>>>>>>>>>>>

ASN.1 to be added based on second round discussion and convergence

<<<<<<<<<<<<<<<<<<< Next Change >>>>>>>>>>>>>>>>>>>>