**3GPP TSG-RAN WG3 Meeting #113-e R3-213567**

**E-meeting, 16-26 Aug 2021**

**Title:** (TP to 38.473 38.463 38.401 CPAC BL CRs) CPAC in disaggregated architecture

**Source:** Huawei

**Agenda item:** 14.3

**Document Type:** Other

# 1. Introduction

In the last meeting, RAN3 discussed the CPAC and has the following WAs for E1/F1:

WA: Prepare one candidate PSCell in one CPAC procedure over F1 interface, same F1AP pair can be reused to prepare different candidate PScell for CPAC, reuse the existing IEs of R16 CHO and CPC. RAN3 only need to modify the procedure description.

WA: For E1AP in all the CPAC cases, reuse the existing IEs and procedures of R16 CHO and CPC. RAN3 only need to modify the procedure description.

In this contribution, we first discuss this open question, and then analyses the related impact.

# 2. Discussion

## 2.4.1 Signalling flows for F1

In the CHO and CPC of R16, for the inter-DU mobility case, the CU sends the *SpCell ID* and the *Conditional Inter-DU Mobility Information* including the *CHO Trigger* and *Target gNB-DU UE F1AP ID* to the DU in the UE context setup request message to add the candidate cell. For the intra-DU mobility case, the CU sends the *SpCell ID* and the *Conditional Intra-DU Mobility Information* including the *CHO Trigger* and the *Candidate Cells to Be Cancelled list* in the UE context modification request message in order to add the candidate cell. For these procedures, the DU includes the *Requested Target Cell ID* in the UE context setup response and UE context setup failure to differentiate the procedure for different candidate cells.

In the CHO and CPC of R16, the CU can initiate the modification of the candidate cell. The CU sets the *CHO Trigger* to “CHO-replace” in the UE context setup request message for inter-DU mobility case and in the UE context modification message for the intra-DU mobility case. The DU also can initiate the modification. The DU uses the *Candidate Cells To Be Cancelled List*  in the UE context modification required message with a cause value “CHO-CPC resources to be changed” for the CU to re-trigger the adding of candidate cell.

In the CHO and CPC of R16, the CU can initiate the cancellation of candidate cell. The CU uses the *Candidate Cells To Be Cancelled List* in the UE context release command message for the inter-DU mobility case and in the UE context modification request message for the intra-DU mobility case. The DU also can initiate the cancellation. The DU uses the *Candidate Cells To Be Cancelled List* in the UE context release request message.

In the CHO and CPC of R16, the DU sends the access success message including the *NR CGI* to inform the CU of which cell the UE has successfully accessed.

In RAN3#112-e meeting, a working assumption was made: Prepare one candidate PSCell in one CPAC procedure over F1 interface, same F1AP pair can be reused to prepare different candidate PScell for CPAC, reuse the existing IEs of R16 CHO and CPC.

In R16 CHO and CPC, the same F1AP pair can be reused for different candidate cell for the same UE, the Requested Target Cell IDs are used to differentiate CHO preparations for different candidate cells. Using same or different X2AP/XnAP ID pair is up to the network implement. In our understanding, CPAC also can use the same principles.

In our understanding, for R17 CPAC, the CU and DU also can initiate the adding/modification/ cancellation of candidate cell. We think R17 CPAC can reuse these existing IEs. Because the existing procedure description is only for the CHO and CPC and does not include the CPA, RAN3 only need to add the CPA case in the procedure description.

1. **Turn the WA to agreement: Prepare one candidate PSCell in one CPAC procedure over F1 interface, same F1AP pair can be reused to prepare different candidate PScell for CPAC, reuse the existing IEs of R16 CHO and CPC.**

In the last meeting, RAN3 has agreed the early data forwarding of PDCP PDUs. As discussed in [1] for Xn/X2, we propose that the node hosting PDCP entity does not need send the first DL count to the corresponding node and ask RAN3 to discuss the two options to inform the discarding of PDCP PDU SNs. For the same reasons, we think F1 can use the same principle of Xn/X2.

1. **The CU does not need send the first DL count to the DU. Use the same options as in Xn/X2 to inform the discarding of PDCP PDU.**

## 2.4.2 Signalling flows for E1

As we known, the CU-UP does not know which cell is configured to the UE. In the CHO and CPC of R16, if the bearer context has existed in the CU-UP, the CU-CP does not need to inform the CU-UP when the CU-CP prepares the candidate cells for the UE. When the UE has accessed the candidate cell, the CU-CP sends the bearer context modification request message to the CU-UP if needed.

If the bearer context has not existed in the CU-UP, the CU-CP sends the bearer context setup request message including the *CHO Initiation* to the CU-UP. The bearer context setup request message indicates to ignore the included security context and not to initiate sending downlink packets until the UE successfully accesses. The CU-CP and CU-UP can initiate the modification/cancellation using the R15 message. When the UE has accessed the candidate cell, the CU-CP sends the bearer context modification request message to the CU-UP.

For the R17 CPA, SN initiated inter-SN CPC, and MN initiated inter-SN CPC, we think the procedures is same to the procedures of R16 inter-CU-UP CHO (i.e. the bearer context has not existed in the candidate CU-UP), we can reuse the exiting IEs and procedures.

According to the TS 38.463, the procedure description of the bearer context setup request message and the early data forwarding SN transfer message only include the CHO case and does not include the CPAC cases. Therefore RAN3 need to modify some procedure description.

1. **Turn the WA to agreement: for E1AP in all the CPAC cases, reuse the existing IEs and procedures of R16 CHO and CPC.**

For the early data forwarding of inter-CU-UP CHO, the source CU-UP sends the early status transfer message to the source CU-CP. And after receiving the early status transfer message from the source NG-RAN, the target CU-CP sends the bearer context modification request message including the early forwarding count request and early forwarding count information to the target CU-UP.

In the last meeting, RAN3 has agreed the early data forwarding of PDCP SDUs and PDCP PDUs. As discussed in [1] for Xn/X2, we propose the early data forwarding between source SN and MN, between MN and target SN. For the early data forwarding of PDCP SDUs, RAN3 can reuse the existing IEs and only need to modify the field descriptions. For the early data forwarding of PDCP PDUs, as discussed in [1] for Xn/X2, the node hosting PDCP entity does not need send the first DL count to the corresponding node. Therefore the CU-UP does not need send the first DL count to the CU-CP. Also there are two options to inform the discarding of PDCP PDU SNs. Option 1: reuse the DL user data frame. Option 2: Use the early status transfer message.

1. **For the early data forwarding of PDCP SDUs, reuse the existing IEs and procedures of R16 CHO.**
2. **For the early data forwarding of PDCP PDUs, the CU-CP does not need send the first DL count to the CU-CP. Use the same options as in Xn/X2 to inform the discarding of PDCP PDU.**

# 3. Conclusions

In this contribution, we discuss the F1 and E1 impacts for CPAC, get the following proposals:

1. **Turn the WA to agreement: Prepare one candidate PSCell in one CPAC procedure over F1 interface, same F1AP pair can be reused to prepare different candidate PScell for CPAC, reuse the existing IEs of R16 CHO and CPC.**
2. **The CU does not need send the first DL count to the DU. Use the same options as in Xn/X2 to inform the discarding of PDCP PDU.**
3. **Turn the WA to agreement: for E1AP in all the CPAC cases, reuse the existing IEs and procedures of R16 CHO and CPC.**
4. **For the early data forwarding of PDCP SDUs, reuse the existing IEs and procedures of R16 CHO.**
5. **For the early data forwarding of PDCP PDUs, the CU-CP does not need send the first DL count to the CU-CP. Use the same options as in Xn/X2 to inform the discarding of PDCP PDU.**

The corresponding TPs to F1AP BL CR, E1AP BL CR, TS 38.401 BL CR are provided in section 5, 6 and7.

# 4. References

[1] R3-213566 (TP to 38.423/36.423 CPAC BL CR) Support of Early data forwarding

# 5 TP to CPAC BL CR of TS 38.473

## *----------Start of the Change--------------*

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in 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 TR 21.905 [1].

5GC 5G Core Network

5QI 5G QoS Identifier

AMF Access and Mobility Management Function

ARP Antenna Reference Point

ARPI Additional RRM Policy Index

BH Backhaul

CAG Closed Access Group

CN Core Network

CG Cell Group

CGI Cell Global Identifier

CHO Conditional Handover

CP Control Plane

CPA Conditional PSCell Addition

CPC Conditional PSCell Change

DAPS Dual Active Protocol Stack

DL Downlink

DL-PRS Downlink Positioning Reference Signal

EN-DC E-UTRA-NR Dual Connectivity

EPC Evolved Packet Core

IAB Integrated Access and Backhaul

IMEISV International Mobile station Equipment Identity and Software Version number

LMF Location Management Function

NID Network Identifier

NPN Non-Public Network

NSSAI Network Slice Selection Assistance Information

posSIB Positioning SIB

PNI-NPN Public Network Integrated NPN

RANAC RAN Area Code

RIM Remote Interference Management

RIM-RS RIM Reference Signal

RRC Radio Resource Control

RSRP Reference Signal Received Power

SNPN Stand-alone Non-Public Network

S-NSSAI Single Network Slice Selection Assistance Information

SUL Supplementary Uplink

TAC Tracking Area Code

TAI Tracking Area Identity

TRP Transmission-Reception Point

UL-AoA Uplink Angle of Arrival

UL-RTOA Uplink Relative Time of Arrival

UL-SRS Uplink Sounding Reference Signal

Z-AoA Zenith Angles of Arrival

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8.3 UE Context Management procedures

8.3.1 UE Context Setup

8.3.1.2 Successful Operation

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If the *PC5 Link Aggregate Bit Rate* IE is contained in theUE CONTEXT SETUP REQUEST message, the gNB-DU shall, if supported, use it for the concerned UE's sidelink communication in network scheduled mode for NR V2X services as defined in TS 23.287 [40].

If the *TSC Traffic Characteristics* IE is included in the UE CONTEXT SETUP REQUEST message, the gNB-DU shall, if supported, take into account the corresponding information received in the *TSC Traffic Characteristics* IE.

If the *Conditional Inter-DU Mobility Information* IE is included in the UE CONTEXT SETUP REQUEST message, the gNB-DU shall consider that the request concerns a conditional handover or conditional PSCell change or conditional PSCell addition for the included *SpCell ID* IE and shall include it as the *Requested Target Cell ID* IE in the UE CONTEXT SETUP RESPONSE message. The gNB-DU shall regard it as a reconfiguration with sync as defined in TS 38.331 [8].

If the *Target gNB-DU UE F1AP ID* IE is contained in the *Conditional Inter-DU Mobility Information* IE included in the UE CONTEXT SETUP REQUEST message, then the gNB-DU shall replace the existing prepared conditional handover or conditional PSCell change or conditional PSCell addition identified by the *Target gNB-DU UE F1AP ID* IE and the *SpCell ID* IE.

If the *Serving NID* IE is contained in the UE CONTEXT SETUP REQUEST message, the gNB-DU shall combine the *Serving NID* IE with the *Serving PLMN* IEto identify the serving NPN, and may take it into account for UE context establishment.

If the *Estimated Arrival Probability* IE is contained in the *Conditional Inter-DU Mobility Information* IE included in the UE CONTEXT SETUP REQUEST message, then the gNB-DU may use the information to allocate necessary resources for the UE.

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8.3.2 UE Context Release Request (gNB-DU initiated)

8.3.2.1 General

The purpose of the UE Context Release Request procedure is to enable the gNB-DU to request the gNB-CU to release the UE-associated logical F1-connection or candidate cells in conditional handover or conditional PSCell change or conditional PSCell addition. The procedure uses UE-associated signalling.

8.3.2.2 Successful Operation

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**Figure 8.3.2.2-1: UE Context Release (gNB-DU initiated) procedure. Successful operation**

The gNB-DU controlling a UE-associated logical F1-connection initiates the procedure by generating a UE CONTEXT RELEASE REQUEST message towards the affected gNB-CU node.

The UE CONTEXT RELEASE REQUEST message shall indicate the appropriate cause value.

If the *Candidate Cells To Be Cancelled List* IE is included in the UE CONTEXT RELEASE REQUEST message, the gNB-CU shall consider that the only the resources reserved for the candidate cells identified by the included NR CGIs and associated to the UE-associated signaling identified by the *gNB-CU UE F1AP ID* IE and the *gNB-DU UE F1AP ID* IE are about to be released by the gNB-DU.

**Interactions with UE Context Release procedure:**

The UE Context Release procedure may be initiated upon reception of a UE CONTEXT RELEASE REQUEST message.

**Interactions with UE Context Setup procedure:**

The UE Context Release Request procedure may be performed before the UE Context Setup procedure to request the release of an existing UE-associated logical F1-connection and related resources in the gNB-DU.

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8.3.3 UE Context Release (gNB-CU initiated)

8.3.3.1 General

The purpose of the UE Context Release procedure is to enable the gNB-CU to order the release of the UE-associated logical connection or candidate cells in conditional handover or conditional PSCell change or conditional PSCell addition. The procedure uses UE-associated signalling.

8.3.3.2 Successful Operation

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**Figure 8.3.3.2-1: UE Context Release (gNB-CU initiated) procedure. Successful operation**

The gNB-CU initiates the procedure by sending the UE CONTEXT RELEASE COMMAND message to the gNB-DU.

Upon reception of the UE CONTEXT RELEASE COMMAND message, the gNB-DU shall release all related signalling and user data transport resources and reply with the UE CONTEXT RELEASE COMPLETE message.

If the *old gNB-DU UE F1AP ID* IE is included in the UE CONTEXT RELEASE COMMAND message, the gNB-DU shall additionally release the UE context associated with the old gNB-DU UE F1AP ID.

If the UE CONTEXT RELEASE COMMAND message contains the *RRC-Container IE*, the gNB-DU shall send the RRC container to the UE via the SRB indicated by the *SRB ID* IE.

If the UE CONTEXT RELEASE COMMAND message includes the *Execute Duplication* IE, the gNB-DU shall perform CA based duplication, if configured, for the SRB for the included *RRC-Container* IE.

If the *Candidate Cells To Be Cancelled List* IE is included in the UE CONTEXT RELEASE COMMAND message, the gNB-DU shall consider that the gNB-CU is cancelling only the conditional handover or conditional PSCell change or conditional PSCell addition associated to the cells identified by the included NR CGIs and associated to the UE-associated signaling identified by the *gNB-CU UE F1AP ID* IE and the *gNB-DU UE F1AP ID* IE.

**Interactions with UE Context Setup procedure:**

The UE Context Release procedure may be performed before the UE Context Setup procedure to release an existing UE-associated logical F1-connection and related resources in the gNB-DU, e.g. when gNB-CU rejects UE access it shall trigger UE Context Release procedure with the cause value of UE rejection.

8.3.3.4 Abnormal Conditions

If one or more candidate cells in the *Candidate Cells To Be Cancelled List* IE included in the UE CONTEXT RELEASE COMMAND message were not prepared using the same UE-associated signalling connection, the gNB-DU shall ignore those non-associated candidate cells.

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8.3.4 UE Context Modification (gNB-CU initiated)

8.3.4.1 General

The purpose of the UE Context Modification procedure is to modify the established UE Context, e.g., establishing, modifying and releasing radio resources or sidelink resources. This procedure is also used to command the gNB-DU to stop data transmission for the UE for mobility (see TS 38.401 [4]). The procedure uses UE-associated signalling.

8.3.4.2 Successful Operation

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**Figure 8.3.4.2-1: UE Context Modification procedure. Successful operation**

The UE CONTEXT MODIFICATION REQUEST message is initiated by the gNB-CU.

Upon reception of the UE CONTEXT MODIFICATION REQUEST message, the gNB-DU shall perform the modifications, and if successful reports the update in the UE CONTEXT MODIFICATION RESPONSE message.

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If the *TSC Traffic Characteristics* IE is included in the UE CONTEXT MODIFICATION REQUEST message, the gNB-DU shall, if supported, take into account the corresponding information received in the *TSC Traffic Characteristics* IE.

If the *Conditional Intra-DU Mobility Information* IE is included in the UE CONTEXT MODIFICATION REQUEST message and the CHO Trigger is set to "CHO-initiation", the gNB-DU shall consider that the request concerns a conditional handover or conditional PSCell change or conditional PSCell addition for the included *SpCell ID* IE and shall include it as the *Requested Target Cell ID* IE in the UE CONTEXT MODIFICATION RESPONSE message. The gNB-DU shall regard it as a reconfiguration with sync as defined in TS 38.331 [8].

If the *Conditional Intra-DU Mobility Information* IE is included in the UE CONTEXT MODIFICATION REQUEST message and the CHO Trigger is set to "CHO-replace", the gNB-DU shall replace the existing prepared conditional mobility identified by the *gNB-DU UE F1AP ID* IE and the *SpCell ID* IE.

If the *Conditional Intra-DU Mobility Information* IE is included in the UE CONTEXT MODIFICATION REQUEST message and the CHO Trigger is set to "CHO-cancel", the gNB-DU shall consider that the gNB-CU is about to remove any reference to, and release any resources previously reserved for the candidate cells associated to the UE-associated signalling identified by the *gNB-CU UE F1AP ID* IE and the *gNB-DU UE F1AP ID* IE. If the *Candidate Cells To Be Cancelled List* IE is also included in the UE CONTEXT MODIFICATION REQUEST message, the gNB-DU shall consider that only the resources reserved for the cells identified by the included NR CGIs are about to be released by the gNB-CU.

If the *Transmission Stop Indicator* IE is included within the *DRB to Be Modified Item* IE in the UE CONTEXT MODIFICATION REQUEST message and set to “true”, the gNB-DU shall, if supported, stop the data transmission for the DRB. It is up to gNB-DU implementation when to stop the UE scheduling for that DRB.

If the *SCG Indicator* IE is contained in the UE CONTEXT MODIFICATION REQUEST message and it is set to “released”, the gNB-DU shall, if supported, deduce that an SCG is removed.

If the *Estimated Arrival Probability* IE is contained in the *Conditional Inter-DU Mobility Information* IE included in the UE CONTEXT MODIFICATION REQUEST message, then the gNB-DU may use the information to allocate necessary resources for the UE.

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### 8.3.5 UE Context Modification Required (gNB-DU initiated)

#### 8.3.5.1 General

The purpose of the UE Context Modification Required procedure is to modify the established UE Context, e.g., modifying and releasing radio bearer resources, or sidelink radio bearer resources or candidate cells in conditional handover or conditional PSCell change or conditional PSCell addition. The procedure uses UE-associated signalling.

#### 8.3.5.2 Successful Operation



Figure 8.3.5.2-1: UE Context Modification Required procedure. Successful operation

The F1AP UE CONTEXT MODIFICATION REQUIRED message is initiated by the gNB-DU.

The gNB-CU reports the successful update of the UE context in the UE CONTEXT MODIFICATION CONFIRM message.

For a given bearer for which PDCP CA duplication was already configured, if two *DL UP TNL Information* IEs are included in UE CONTEXT MODIFICATION REQUIRED message for a DRB, the gNB-CU shall include two *UL UP TNL Information* IEs in UE CONTEXT MODIFICATION CONFIRM message. The gNB-CU and gNB-DU use the *UL UP TNL Information* IEs and *DL UP TNL Information* IEs to support packet duplication for intra-gNB-DU CA as defined in TS 38.470 [2], and the first *UP TNL Information* IE is still for the primary path.

For a given bearer for which PDCP CA duplication was already configured, if one or two *Additional PDCP Duplication UP TNL Information* IEs are included in the UE CONTEXT MODIFICATION REQUIRED message for a DRB, the gNB-CU shall, if supported, include one or two *Additional PDCP Duplication UP TNL Information* IEs in the UE CONTEXT MODIFICATION CONFIRM message. The gNB-CU and gNB-DU use the *Additional PDCP Duplication UP TNL Information* IEs to support packet duplication for intra-gNB-DU CA as defined in TS 38.470 [2].

If the *BH Information* IE is included in the *UL UP TNL Information to be setup List* IE or the *Additional PDCP Duplication TNL List* IE for a DRB, the gNB-DU shall, if supported, use the indicated BAP Routing ID and BH RLC channel for transmission of the corresponding GTP-U packets to the IAB-donor, as specified in TS 38.340 [30].

If the *Resource Coordination Transfer Container* IE is included in the UE CONTEXT MODIFICATION REQUIRED, the gNB-CU shall transparently transfer this information for the purpose of resource coordination as described in TS 36.423 [9], TS 38.423 [28].

For EN-DC operation, if the gNB-CU includes the *Resource Coordination Transfer Information* IE in the UE CONTEXT MODIFICATION CONFIRM message, the gNB-DU shall, if supported, use it for the purpose of resource coordination. If the gNB-CU received the MeNB Resource Coordination Information as defined in TS 36.423 [9], after completion of UE Context Modification Required procedures, the gNB-CU shall transparently transfer it to the gNB-DU via the *Resource Coordination Transfer Container* IE in the UE CONTEXT MODIFICATION CONFIRM message. The gNB-DU shall use the information received in the *Resource Coordination Transfer Container* IE for reception of MeNB Resource Coordination Information at the gNB acting as secondary node as described in TS 36.423 [9]. If the *Resource Coordination E-UTRA Cell Information* IE is included in the *Resource Coordination Transfer Information* IE, the gNB-DU shall store the information replacing previously received information for the same E-UTRA cell, and use the stored information for the purpose of resource coordination. If the *Ignore PRACH Configuration* IE is present and set to "true" the *E-UTRA PRACH Configuration* IE in the UE CONTEXT MODIFICATION CONFIRM message shall be ignored.

For NGEN-DC or NE-DC operation, if the gNB-CU includes the *Resource Coordination Transfer Information* IE in the UE CONTEXT MODIFICATION CONFIRM message, the gNB-DU shall, if supported, use it for the purpose of resource coordination. If the gNB-CU received the MR-DC Resource Coordination Information as defined in TS 38.423 [28], after completion of UE Context Modification Required procedures, the gNB-CU shall transparently transfer it to the gNB-DU via the *Resource Coordination Transfer Container* IE in the UE CONTEXT MODIFICATION CONFIRM message. The gNB-DU shall use the information received in the *Resource Coordination Transfer Container* IE for reception of MR-DC Resource Coordination Information at the gNB as described in TS 38.423 [28].

If the *CellGroupConfig* IE is included in the *DU to CU RRC Information* IE contained in the UE CONTEXT MODIFICATION REQUIRED message, the gNB-CU shall perform RRC Reconfiguration as described in TS 38.331 [8]. The *CellGroupConfig* IE shall transparently be signaled to the UE as specified in TS 38.331 [8].

If the UE CONTEXT MODIFICATION CONFIRM message includes the *Execute Duplication* IE, the gNB-DU shall perform CA based duplication, if configured, for the SRB for the included *RRC-Container* IE.

If the UE CONTEXT MODIFICATION REQUIRED message contains the *RLC Status* IE, the gNB-CU shall assume that RLC has been reestablished at the gNB-DU and may trigger PDCP data recovery.

If the *Candidate Cells To Be Cancelled List* IE is included in the UE CONTEXT MODIFICATION REQUIRED message, the gNB-CU shall consider that only the resources reserved for the candidate cells identified by the included NR CGIs and associated to the UE-associated signaling identified by the *gNB-CU UE F1AP ID* IE and the *gNB-CU UE F1AP ID* IE are about to be released by the gNB-DU.

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8.3.8 Access Success

8.3.8.1 General

The purpose of the Access Success procedure is to enable the gNB-DU to inform the gNB-CU of which cell the UE has successfully accessed during conditional handover or conditional PSCell change or conditional PSCell addition. The procedure uses UE-associated signalling.

8.3.8.2 Successful Operation

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**Figure 8.3.8.2-1: Access Success procedure. Successful operation.**

The gNB-DU initiates the procedure by sending a ACCESS SUCCESS message.

Upon reception of the ACCESS SUCCESS message, the gNB-CU shall consider that the UE successfully accessed the cell indicated by the included *NR CGI* IE in this gNB-DU and consider all the other CHO preparations or conditional PSCell change or conditional PSCell addition preparations accepted for this UE under the same UE-associated signaling connection in this gNB-DU as cancelled.

**Interaction with other procedure:**

The gNB-CU may initiate UE Context Release procedure toward the other signalling connections or other candidate gNB-DUs for this UE, if any.

8.3.8.3 Abnormal Conditions

If the ACCESS SUCCESS message refers to a context that does not exist, the gNB-CU shall ignore the message.

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### 9.2.2 UE Context Management messages

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9.2.2.4 UE CONTEXT RELEASE REQUEST

This message is sent by the gNB-DU to request the gNB-CU to release the UE-associated logical F1 connection or candidate cells in conditional handover or conditional PSCell change or conditional PSCell addition.

Direction: gNB-DU → gNB-CU

| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** | **Criticality** | **Assigned Criticality** |
| --- | --- | --- | --- | --- | --- | --- |
| Message Type | M |  | 9.3.1.1 |  | YES | ignore |
| gNB-CU UE F1AP ID | M |  | 9.3.1.4 |  | YES | reject |
| gNB-DU UE F1AP ID | M |  | 9.3.1.5 |  | YES | reject |
| Cause | M |  | 9.3.1.2 |  | YES | ignore |
| **Candidate Cells To Be Cancelled List** |  | *0 .. <maxnoofCellsinCHO>* |  |  | YES | reject |
| >Target Cell ID | M |  | NR CGI9.3.1.12 |  | - | - |

|  |  |
| --- | --- |
| **Range bound** | **Explanation** |
| maxnoofCellsinCHO | Maximum no. cells that can be prepared for a conditional mobility. Value is 8. |

9.2.2.5 UE CONTEXT RELEASE COMMAND

This message is sent by the gNB-CU to request the gNB-DU to release the UE-associated logical F1 connection or candidate cells in conditional handover or conditional PSCell change or conditional PSCell addition.

Direction: gNB-CU → gNB-DU

| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** | **Criticality** | **Assigned Criticality** |
| --- | --- | --- | --- | --- | --- | --- |
| Message Type | M |  | 9.3.1.1 |  | YES | reject |
| gNB-CU UE F1AP ID | M |  | 9.3.1.4 |  | YES | reject |
| gNB-DU UE F1AP ID | M |  | 9.3.1.5 |  | YES | reject |
| Cause | M |  | 9.3.1.2 |  | YES | ignore |
| RRC-Container | O |  | 9.3.1.6 | Includes the *DL-DCCH-Message* IE as defined in subclause 6.2 of TS 38.331 [8] encapsulated in a PDCP PDU, or the *DL-CCCH-Message* IE as defined in subclause 6.2 of TS 38.331 [8]. | YES | ignore |
| SRB ID | C- ifRRCContainer |  | 9.3.1.7 | The gNB-DU sends the RRC message on the indicated SRB. | YES | ignore |
| old gNB-DU UE F1AP ID | O |  | 9.3.1.5 | Include it if RRCReestablishmentRequest is not accepted | YES | ignore |
| Execute Duplication | O |  | ENUMERATED (true, ...) | This IE may be sent only if duplication has been configured for the UE.  | YES | ignore |
| RRC Delivery Status Request | O |  | ENUMERATED (true, …) | Indicates whether RRC DELIVERY REPORT procedure is requested for the RRC message. | YES | ignore |
| **Candidate Cells To Be Cancelled List** |  | *0 .. <maxnoofCellsinCHO>* |  |  | YES | reject |
| >Target Cell ID | M |  | NR CGI9.3.1.12 |  | - | - |

|  |  |
| --- | --- |
| **Range bound** | **Explanation** |
| maxnoofCellsinCHO | Maximum no. cells that can be prepared for a conditional mobility. Value is 8. |

|  |  |
| --- | --- |
| **Condition** | **Explanation** |
| ifRRCContainer | This IE shall be present if the *RRC container* IE is present. |

9.2.2.6 UE CONTEXT RELEASE COMPLETE

This message is sent by the gNB-DU to confirm the release of the UE-associated logical F1 connection or candidate cells in conditional handover or conditional PSCell change or conditional PSCell addition.

Direction: gNB-DU → gNB-CU

| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** | **Criticality** | **Assigned Criticality** |
| --- | --- | --- | --- | --- | --- | --- |
| Message Type | M |  | 9.3.1.1 |  | YES | reject |
| gNB-CU UE F1AP ID | M |  | 9.3.1.4 |  | YES | reject |
| gNB-DU UE F1AP ID | M |  | 9.3.1.5 |  | YES | reject |
| Criticality Diagnostics | O |  | 9.3.1.3 |  | YES | ignore |

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9.2.2.14 ACCESS SUCCESS

This message is sent by the gNB-DU to inform the gNB-CU of which cell the UE has successfully accessed during conditional handover or conditional PSCell change or conditional PSCell addition.

Direction: gNB-DU → gNB-CU

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** | **Criticality** | **Assigned Criticality** |
| Message Type | M |  | 9.3.1.1 |  | YES | ignore |
| gNB-CU UE F1AP ID | M |  | 9.3.1.4 |  | YES | reject |
| gNB-DU UE F1AP ID | M |  | 9.3.1.5 |  | YES | reject |
| NR CGI | M |  | 9.3.1.12 |  | YES | reject |

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9.2.2.x EARLY STATUS TRANSFER(option 2 FFS)

This message is sent by the gNB-CU to transfer the COUNT value related to the forwarded downlink PDUs during conditional PSCell change or conditional PSCell addition.

Direction: gNB-CU → gNB-DU

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** | **Criticality** | **Assigned Criticality** |
| Message Type | M |  | 9.3.1.1 |  | YES | ignore |
| gNB-CU UE F1AP ID | M |  | 9.3.1.4 |  | YES | reject |
| gNB-DU UE F1AP ID | M |  | 9.3.1.5 |  | YES | reject |
| **DRBs Subject To DL Discarding List** | M | *1* |  |  | YES | reject |
| **>DRBs Subject To DL Discarding Item** |  | *1 .. <maxnoofDRBs>* |  |  | - | - |
| >>DRB ID | M |  | 9.3.1.8 |  | - | - |
| >>>CHOICE *DL Discarding* | M |  |  |  | – |  |
| >>>>12 bits |  |  |  |  |  |  |
| >>>>>DISCARD DL COUNT Value | M |  | COUNT Value for PDCP SN Length 12 (FFS) | PDCP-SN and Hyper frame number for which the gNB-DU should discard forwarded DL PDUs associated with lower values in case of 12 bit long PDCP-SN | – |  |
| >>>>18 bits |  |  |  |  |  |  |
| >>>>>DISCARD DL COUNT Value | M |  | COUNT Value for PDCP SN Length 18 (FFS) | PDCP-SN and Hyper frame number for which the gNB-DU should discard forwarded DL PDUs associated with lower values in case of 18 bit long PDCP-SN | – |  |

## *----------End of the Change--------------*

# 6 TP to CPAC BL CR of TS 38.463

## *----------Start of the Change--------------*

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in 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 TR 21.905 [1].

5GC 5G Core Network

5QI 5G QoS Identifier

CAG Closed Access Group

CGI Cell Global Identifier

CHO Conditional Handover

CN Core Network

CP Control Plane

CPA Conditional PSCell Addition

CPC Conditional PSCell Change

DAPS Dual Active Protocol Stack

DL Downlink

EHC Ethernet Header Compression

EN-DC E-UTRA-NR Dual Connectivity

EPC Evolved Packet Core

IAB Integrated Access and Backhaul

MCG Master Cell Group

NID Network Identifier

NPN Non-Public Network

PNI-NPN Public Network Integrated Non-Public Network

NSSAI Network Slice Selection Assistance Information

RANAC RAN Area Code

SCG Secondary Cell Group

SDAP Service Data Adaptation Protocol

SNPN Stand-alone Non-Public Network

S-NSSAI Single Network Slice Selection Assistance Information

TNLA Transport Network Layer Association

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## 8.3 Bearer Context Management procedures

### 8.3.1 Bearer Context Setup

#### 8.3.1.1 General

The purpose of the Bearer Context Setup procedure is to allow the gNB-CU-CP to establish a bearer context in the gNB-CU-UP. The procedure uses UE-associated signalling.

#### 8.3.1.2 Successful Operation



Figure 8.3.1.2-1: Bearer Context Setup procedure: Successful Operation.

The gNB-CU-CP initiates the procedure by sending the BEARER CONTEXT SETUP REQUEST message to the gNB-CU-UP. If the gNB-CU-UP succeeds to establish the requested resources, it replies to the gNB-CU-CP with the BEARER CONTEXT SETUP RESPONSE message.

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If the *EHC parameters* IE is included in the *PDCP Configuration* IE contained in the BEARER CONTEXT SETUP REQUEST message, the gNB-CU-UP may take these parameters into account to perform appropriate header compression for the concerned DRB.

If the *DAPS Request Information* IE is included for a DRB to be setup in the BEARER CONTEXT SETUP REQUEST message, the gNB-CU-UP shall consider that the request concerns a DAPS handover for that DRB and, if admitted, act as specified in TS 38.300 [4].

If the *CHO Initiation* IE is contained in the BEARER CONTEXT SETUP REQUEST message, the gNB-CU-UP shall consider that the request concerns conditional handover or conditional PSCell change or conditional PSCell addition and act as specified in TS 38.401 [2].

If the *MCG Offered GBR QoS Flow Information* IE is contained in the *QoS Flows Information To Be Setup* IE within the *DRB To Setup List* IE in the BEARER CONTEXT SETUP REQUEST message, the gNB-CU-UP may take it into account when two cell groups are served by the gNB-CU-UP.

If the *Additional Handover Information* IE is included in the BEARER CONTEXT SETUP REQUEST message and set to “Discard PDCP SN”, the gNB-CU-UP shall, if supported, remove the forwarded PDCP SNs if received in the forwarded GTP-U packets, and deliver the forwarded PDCP SDUs to the UE, as specified in TS 38.300 [8].

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### 8.3.12 Early Forwarding SN Transfer

#### 8.3.12.1 General

The purpose of the Early Forwarding SN Transfer procedure is to transfer, from the source gNB-CU-UP to the source gNB-CU-CP, DL COUNT of the last PDCP SDU successfully delivered or transmitted to the UE, for the purpose of discarding early forwarded downlink PDCP SDUs during Conditional Handover or conditional PSCell change or conditional PSCell addition.

The procedure uses UE-associated signalling.

#### 8.3.12.2 Successful Operation



Figure 8.3.12.2-1: Early Forwarding SN Transfer procedure: Successful Operation.

The source gNB-CU-UP initiates the procedure by sending the EARLY FORWARDING SN TRANSFER message.

The *DRBs Subject To Early Forwarding List* IE included in the EARLY FORWARDING SN TRANSFER message contains the DRB ID(s) corresponding to the DRB(s) subject to early data forwarding during Conditional Handover or conditional PSCell change or conditional PSCell addition.

For each DRB in the *DRBs Subject To Early Forwarding List* IE, the value of the *DL COUNT Value* IE indicates the DL COUNT of the last PDCP SDU successfully delivered in-sequence to the UE, if RLC-AM, and successfully transmitted, if RLC-UM.

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## 9.2 Message Functional Definition and Content

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### 9.2.2 Bearer Context Management messages

#### 9.2.2.18 EARLY FORWARDING SN TRANSFER

This message is sent by the source gNB-CU-UP to the source gNB-CU-CP to transfer the COUNT value(s) related to early forwarded downlink PDCP SDUs during Conditional Handover or conditional PSCell change or conditional PSCell addition.

Direction: gNB-CU-UP → gNB-CU-CP

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| Message Type | M |  | 9.3.1.1 |  | YES | reject |
| gNB-CU-CP UE E1AP ID | M  |  | 9.3.1.4 |  | YES | reject |
| gNB-CU-UP UE E1AP ID  | M |  | 9.3.1.5 |  | YES | reject |
| DRBs Subject To Early Forwarding List | M | *1* |  |  | YES | reject |
| >DRBs Subject To Early Forwarding Item |  | *1 .. <maxnoofDRBs>* |  |  | - | - |
| >>DRB ID | M |  | 9.3.1.16 |  | - | - |
| >>DL COUNT Value | M |  | PDCP Count9.3.1.35 | PDCP-SN and Hyper frame number of the last DL SDU or DL PDUs [option 2 FFS] successfully delivered in sequence to the UE, if RLC-AM, and successfully transmitted, if RLC-UM. | - | - |

#### 9.3.1.92 Early Forwarding COUNT Information

This IE contains DL COUNT value related to early data forwarding during DAPS Handover or Conditional Handover or conditional PSCell change or conditional PSCell addition.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| CHOICE *Early Forwarding* | M |  |  |  |
| *>First DL COUNT* |  |  |  |  |
| >>FIRST DL COUNT Value | M |  | PDCP Count9.3.1.35 | PDCP-SN and Hyper frame number of the first DL SDU that the source NG-RAN node forwards to the target NG-RAN node |
| *>DL Discarding* |  |  |  |  |
| >>DISCARD DL COUNT Value | M |  | PDCP Count9.3.1.35 | PDCP-SN and Hyper frame number for which the target NG-RAN node should discard forwarded DL SDUs or DL PDUs [option 2 FFS] associated with lower values. |

## *----------End of the Change--------------*

# 7 TP to CPAC BL CR of TS 38.401

## *----------Start of the Change--------------*

## 3.1 Definitions

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

**Conditional Handover:** as defined in TS 38.300 [2].

**Conditional PSCell Addition:** as defined in TS 37.340 [12].

**Conditional PSCell Change:** as defined in TS 37.340 [12].

**DAPS Handover:** as defined in TS 38.300 [2].

**en-gNB**: as defined in TS 37.340 [12].

**Early Data Forwarding**: as defined in TS 38.300 [2].

**gNB:** as defined in TS 38.300 [2].

**gNB Central Unit (gNB-CU):** a logical node hosting RRC, SDAP and PDCP protocols of the gNB or RRC and PDCP protocols of the en-gNB that controls the operation of one or more gNB-DUs. The gNB-CU terminates the F1 interface connected with the gNB-DU.

**gNB Distributed Unit (gNB-DU):** a logical node hosting RLC, MAC and PHY layers of the gNB or en-gNB, and its operation is partly controlled by gNB-CU. One gNB-DU supports one or multiple cells. One cell is supported by only one gNB-DU. The gNB-DU terminates the F1 interface connected with the gNB-CU.

**gNB-CU-Control Plane (gNB-CU-CP):** a logical node hosting the RRC and the control plane part of the PDCP protocol of the gNB-CU for an en-gNB or a gNB. The gNB-CU-CP terminates the E1 interface connected with the gNB-CU-UP and the F1-C interface connected with the gNB-DU.

**gNB-CU-User Plane (gNB-CU-UP):** a logical node hosting the user plane part of the PDCP protocol of the gNB-CU for an en-gNB, and the user plane part of the PDCP protocol and the SDAP protocol of the gNB-CU for a gNB. The gNB-CU-UP terminates the E1 interface connected with the gNB-CU-CP and the F1-U interface connected with the gNB-DU.

**IAB-node**: as defined in TS 38.300 [2].

**IAB-donor**:as defined in TS 38.300 [2].

**IAB-donor-CU**: the gNB-CU of an IAB-donor, terminating the F1 interface towards IAB-nodes and IAB-donor-DU.

**IAB-donor-DU**: the gNB-DU of an IAB-donor, hosting the IAB BAP sublayer (as defined in TS 38.340 [22]), providing wireless backhaul to IAB-nodes.

**IAB-DU**: as defined in TS 38.300 [2].

**IAB-MT**: as defined in TS 38.300 [2].

**ng-eNB:** as defined in TS 38.300 [2].

**ng-eNB Central Unit (ng-eNB-CU):** as defined in TS 37.470 [21].

**ng-eNB Distributed Unit (ng-eNB-DU):** as defined in TS 37.470 [21].

**NG-RAN node:** as defined in TS 38.300 [2].

**PDU Session Resource**: This term is used for specification of NG, Xn, and E1 interfaces. It denotes NG-RAN interface and radio resources provided to support a PDU Session.

**Public Network Integrated NPN:** as defined in TS 23.501 [3].

**Stand-alone Non-Public Network:** as defined in TS 23.501 [3].

## 3.2 Abbreviations

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

5GC 5G Core Network

AMF Access and Mobility Management Function

AP Application Protocol

AS Access Stratum

BH Backhaul

CAG Closed Access Group

CHO Conditional Handover

CPA Conditional PSCell Addition

CPC Conditional PSCell Change

CLI Cross-Link Interference

CM Connection Management

CMAS Commercial Mobile Alert Service

DAPS Dual Active Protocol Stack

ETWS Earthquake and Tsunami Warning System

F1-U F1 User plane interface

F1-C F1 Control plane interface

F1AP F1 Application Protocol

FDD Frequency Division Duplex

GTP-U GPRS Tunnelling Protocol

IAB Integrated Access and Backhaul

IP Internet Protocol

NAS Non-Access Stratum

NID Network identifier

NPN Non-Public Network

PNI-NPN Public Network Integrated Non-Public Network

O&M Operation and Maintenance

PWS Public Warning System

QoS Quality of Service

RET Remote Electrical Tilting

RIM Remote Interference Management

RIM-RS Remote Interference Management Reference Signal

RNL Radio Network Layer

RRC Radio Resource Control

SAP Service Access Point

SCTP Stream Control Transmission Protocol

SFN System Frame Number

SM Session Management

SMF Session Management Function

SNPN Stand-alone Non-Public Network

TDD Time Division Duplex

TDM Time Division Multiplexing

TMA Tower Mounted Amplifier

TNL Transport Network Layer

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### 8.9.2 Bearer context setup over F1-U

Figure 8.9.2-1 shows the procedure used to setup the bearer context in the gNB-CU-UP.



Figure 8.9.2-1: Bearer context setup over F1-U

0. Bearer context setup (e.g., following an SGNB ADDITION REQUEST message from the MeNB) is triggered in gNB-CU-CP.

1. The gNB-CU-CP sends a BEARER CONTEXT SETUP REQUEST message containing UL TNL address information for S1-U or NG-U, and if required, DL TNL address information for X2-U or Xn-U to setup the bearer context in the gNB-CU-UP. For NG-RAN, the gNB-CU-CP decides flow-to-DRB mapping and sends the generated SDAP and PDCP configuration to the gNB-CU-UP.

NOTE: In case of Conditional Handover or Conditional PSCell Addition/Change, the BEARER CONTEXT SETUP REQUEST message indicates to ignore the included security context and not to initiate sending downlink packets until the UE successfully accesses. Up to implementation, the gNB-CU-CP may request to establish bearer context as if a regular HO was requested.

2. The gNB-CU-UP responds with a BEARER CONTEXT SETUP RESPONSE message containing the UL TNL address information for F1-U, and DL TNL address information for S1-U or NG-U, and if required, UL TNL address information for X2-U or Xn-U.

NOTE: The indirect data transmission for split bearer through the gNB-CU-UP is not precluded.

3. F1 UE context setup procedure is performed to setup one or more bearers in the gNB-DU.

4. The gNB-CU-CP sends a BEARER CONTEXT MODIFICATION REQUEST message containing the DL TNL address information for F1-U and PDCP status.

5. The gNB-CU-UP responds with a BEARER CONTEXT MODIFICATION RESPONSE message.

## *----------End of the Change--------------*