3GPP TSG-RAN WG3 Meeting #114-bis-e R3-221126

E-meeting, 17 – 26 January 2022

**Agenda item: 14.3**

**Source: Nokia (rapporteur)**

**Title: (TP to CPAC BL CR to 36.423, LTE\_NR\_DC\_enh2-Core) CPAC BL CR rapporteur’s corrections**

**Document for: Endorsement**

# 1 Introduction

RAN3 works on the BL CR for CPAC [1]. Changes are introduced following lengthy discussions and often there is little time to review them. In this document, some corrections and edits to the CPAC BL CR are proposed.

# 2 Discussion

Following the discussion at RAN3 #114-bis [2], it was agreed to introduce selected updates to the BL CR for the X2AP.

# 3 References

1. R3-216248, RAN3 #114
2. R3-221032, RAN3 #114b

# 4 Text proposal for BL CR to TS 36.423

This text proposal is based on the last endorsed BL CR for TS 36.423 [1].

Please note, ASN.1 is missing and will be added once the proposal is agreed.

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| **First change, ommited text not changed** |

### 8.2.7 Early Status Transfer

#### 8.2.7.1 General

The purpose of the Early Status Transfer procedure is to transfer the COUNT of the first downlink SDU that the source eNB forwards to the target eNB or the COUNT for discarding already forwarded downlink SDUs for respective E-RAB during DAPS Handover or Conditional Handover.

For Dual Connectivity or EN-DC, the Early Status Transfer procedure is also used, during a Conditional Handover, from the SeNB to the MeNB as specified in TS 36.300 [15], or from the en-gNB to the MeNB as specified in TS 37.340 [32].

For Conditional PSCell Addition in EN-DC, the Early Status Transfer procedure is also used, from the MeNB to the en-gNB as specified in TS 37.340 [32].

For Conditional PSCell Change in EN-DC, the Early Status Transfer procedure is also used, from the source en-gNB to the MeNB, and from the MeNB to the target en-gNB, as specified in TS 37.340 [32].

The procedure uses UE-associated signalling.

#### 8.2.7.2 Successful Operation



Figure 8.2.7.2-1: Early Status Transfer during DAPS Handover or Conditional Handover, successful operation



Figure 8.2.7.2-2: Early Status Transfer during Conditional Handover in dual connectivity or EN-DC operation, successful operation



Figure 8.2.7.2-x: Early Status Transfer during CPAC in EN-DC operation, successful operation

**From source eNB to target eNB**

The *E-RABs Subject To Early Status Transfer List* IE included in the EARLY STATUS TRANSFER message contains the E-RAB ID(s) corresponding to the E-RAB(s) subject to be simultaneously served by the source and the target eNBs during DAPS Handover or the E-RAB(s) transferred during Conditional Handover.

For each E-RAB for which the *FIRST DL COUNT Value* IE is received in the EARLY STATUS TRANSFER message, the target eNB shall use it as the COUNT of the first downlink SDU that the source eNB forwards to the target eNB. If the *FIRST DL COUNT Value Extended* IE or *FIRST DL COUNT Value for PDCP SN Length 18* IE is included in the *E-RABs Subject To Early Status Transfer Item* IE, the target eNB shall, if supported, use this value instead of the value contained in the *FIRST DL COUNT Value* IE.

For each E-RAB for which the *DISCARD DL COUNT Value* IE is received in the EARLY STATUS TRANSFER message, the target eNB does not transmit forwarded downlink SDUs to the UE whose COUNT is less than the provided and discards them if transmission has not been attempted. If the *DISCARD DL COUNT Value Extended* IE or *DISCARD DL COUNT Value for PDCP SN Length 18* IE is included in the *E-RABs Subject To Early Status Transfer Item* IE, the target eNB shall, if supported, use this value instead of the value contained in the *DISCARD DL COUNT Value* IE.

**From SeNB (respectively, en-gNB) to MeNB (respectively, eNB), the source eNB for Conditional Handover**

**From MeNB to en-gNB for Conditional PSCell Addition**

**From source en-gNB to MeNB, and from MeNB to target en-gNB, for CPAC**

The *E-RABs Subject To Early Status Transfer List* IE included in the EARLY STATUS TRANSFER message contains the E-RAB ID(s) corresponding to the E-RAB(s) transferred during Conditional Handover or during CPAC.

For each E-RAB in the *E-RABs Subject To Early Status Transfer List* IE, the source eNB shall forward to the target during Conditional Handover, or the sending node shall forward to the receiving node during CPAC, the value of the received *FIRST DL COUNT Value* IE or *DISCARD DL COUNT Value* IE. If the *FIRST DL COUNT Value Extended* IE or *FIRST DL COUNT Value for PDCP SN Length 18* IE is included, if supported, this value is forwarded instead of the value contained in the *FIRST DL COUNT Value* IE. If the *DISCARD DL COUNT Value Extended* IE or *DISCARD DL COUNT Value for PDCP SN Length 18* IE is included, if supported, this value is forwarded instead of the value contained in the *DISCARD DL COUNT Value* IE.

If the en-gNB sends the message to the MeNB, then the *SgNB UE X2AP ID* IE shall be included in the EARLY STATUS TRANSFER message, while the *Old eNB UE X2AP ID* IE is ignored. The *SgNB UE X2AP ID* IE is used as the old UE ID.

#### 8.2.7.3 Abnormal Conditions

If the target eNB receives this message for a UE for which no prepared DAPS Handover or Conditional Handover exists at the target eNB, the target eNB shall ignore the message.

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| **Next change, ommited text not changed** |

### 8.3.15 Data Forwarding Address Indication

#### 8.3.15.1 General

The purpose of the Data Forwarding Address Indication procedure is to allow the new eNB to provide data forwarding addresses to the old eNB in case the RRC connection has been re-established, as specified in TS 36.300 [15].

For Dual Connectivity or EN-DC, the Data Forwarding Address Indication procedure is used during a Conditional Handover to provide data forwarding related information from the MeNB to the SeNB as specified in TS 36.300 [15], or from the MeNB to the en-gNB as specified in TS 37.340 [32].

The procedure uses UE-associated signalling.

#### 8.3.15.2 Successful Operation



Figure 8.3.15.2-1: Data Forwarding Address Indication, successful operation

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Figure 8.3.15.2-2: Data Forwarding Address Indication for Conditional Handover, successful operation

The new eNB initiates the procedure by sending a DATA FORWARDING ADDRESS INDICATION message to the old eNB.

For each E-RAB included in *E-RABs Data Forwarding Address List* IE, the new eNB indicates that it requests data forwarding of downlink packets to the GTP TEID indicated in the *DL GTP Tunnel Endpoint* IE.

If the DATA FORWARDING ADDRESS INDICATION message includes the *CHO DC Indicator* IE, the SeNB (respectively, the en-gNB for EN-DC) shall, if supported, consider that the DATA FORWARDING ADDRESS INDICATION message concerns a Conditional Handover, and act as specified in TS 36.300 [15] for dual connectivity (respectively, act as specified in TS 37.340 [32] for EN-DC).

If the DATA FORWARDING ADDRESS INDICATION message includes the *CHO DC Early Data Forwarding Indicator* IE set to “stop”, the SeNB (respectively, the en-gNB for EN-DC) shall, if supported and if already initiated, stop early data forwarding for the provided E-RABs Data Forwarding Address information.

If the DATA FORWARDING ADDRESS INDICATION message includes the *CPC Indicator* IE set to “triggered”, the en-gNB for EN-DC shall, if supported, consider that the DATA FORWARDING ADDRESS INDICATION message concerns a Conditional PSCell Change, and act as specified in TS 37.340 [32]. If the *CPC Indicator* IE is set to "early data transmission stop", the en-gNB shall, if supported and if already initiated, stop early data forwarding for the provided Data Forwarding Address information.

If the DATA FORWARDING ADDRESS INDICATION message includes the *CPC Indicator* IE set to “excuted”, the en-gNB for EN-DC shall, if supported and if already triggered, consider that the DATA FORWARDING ADDRESS INDICATION message executes a Conditionl PSCell Change, and act as specified in TS 37.340 [32].

**EN-DC**

If the MeNB sends the message to the en-gNB, then the *SgNB UE X2AP ID* IE shall be included in the DATA FORWARDING ADDRESS INDICATION message, while the *New eNB UE X2AP ID* IE is ignored. The *SgNB UE X2AP ID* IE is used as the new UE ID.

#### 8.3.15.3 Unsuccessful Operation

Not applicable.

#### 8.3.15.4 Abnormal Conditions

Void.

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| **Next change, ommited text not changed** |

#### 9.1.1.9 EARLY STATUS TRANSFER

This message is sent by the source eNB to the target eNB to transfer the COUNT value related to the forwarded downlink SDUs during DAPS Handover or Conditional Handover.

During a Conditional Handover with EN-DC or Dual Connectivity, or CPAC in EN-DC, this message is also used to transfer the COUNT value related to the forwarded downlink SDUs. In case of EN-DC, the COUNT value is transferred from the en-gNB to the eNB, while in case of Dual Connectivity, the COUNT value is transferred from the SeNB to the MeNB. In case of Conditional PSCell Addition, the COUNT value is transferred from the eNB to the en-gNB. In case of Conditional PSCell Change, the COUNT value is transferred from the source en-gNB to the eNB, and from eNB to the target en-gNB.

Direction: source eNB → target eNB (DAPS Handover or Conditional Handover).

Direction: en-gNB → MeNB (Conditional Handover with EN-DC), SeNB → MeNB (Conditional Handover with Dual Connectivity)

Direction: eNB → en-gNB (Conditional PSCell Addition)

Direction: source en-gNB → eNB, eNB → target en-gNB (Conditional PSCell Change)

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| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| Message Type | M |  | 9.2.13 |  | YES | ignore |
| Old eNB UE X2AP ID | M |  | eNB UE X2AP ID9.2.24 | Allocated for DAPS handover or Conditional handover at the source eNB | YES | reject |
| New eNB UE X2AP ID | M |  | eNB UE X2AP ID9.2.24 | Allocated for DAPS handover or Conditional handover at the target eNB | YES | reject |
| Old eNB UE X2AP ID Extension | O |  | Extended eNB UE X2AP ID9.2.86 | Allocated for DAPS handover or Conditional handover at the source eNB | YES | reject |
| New eNB UE X2AP ID Extension | O |  | Extended eNB UE X2AP ID9.2.86 | Allocated for DAPS handover or Conditional handover at the target eNB | YES | reject |
| CHOICE Procedure Stage | M |  |  |  | YES | reject |
| *>First DL COUNT* |  |  |  |  |  |  |
| >>**E-RABs Subject To Early Status Transfer List** |  | *1 .. <maxnoofBearers>* |  |  | – |  |
| >>>**E-RABs Subject To Early Status Transfer Item** |  |  |  |  | – |  |
| >>>>E-RAB ID | M |  | 9.2.23 |  | – |  |
| >>>>FIRST DL COUNT Value | M |  | COUNT Value9.2.15 | PDCP-SN and Hyper frame number of the first DL SDU that the source eNB/MeNB forwards to the target eNB/en-gNB in case of 12 bit long PDCP-SN | – |  |
| >>>>FIRST DL COUNT Value Extended | O |  | COUNT Value Extended 9.2.66 | PDCP-SN and Hyper frame number of the first DL SDU that the source eNB/MeNB forwards to the target eNB/en-gNB in case of 15 bit long PDCP-SN | – |  |
| >>>>FIRST DL COUNT Value for PDCP SN Length 18 | O |  | COUNT Value for PDCP SN Length 189.2.82 | PDCP-SN and Hyper frame number of the first DL SDU that the source eNB/MeNB forwards to the target eNB/en-gNB in case of 18 bit long PDCP-SN | – |  |
| *>DL Discarding* |  |  |  |  |  |  |
| >>**E-RABs Subject To DL Discarding List** | M | *1* |  |  | – |  |
| >>>**E-RABs Subject To DL Discarding Item** |  | *1 .. <maxnoofBearers>* |  |  | – |  |
| >>>>E-RAB ID | M |  | 9.2.23 |  | – |  |
| >>>>DISCARD DL COUNT Value | M |  | COUNT Value9.2.15 | PDCP-SN and Hyper frame number for which the target eNB/en-gNB should discard forwarded DL SDUs associated with lower values in case of 12 bit long PDCP-SN | – |  |
| >>>>DISCARD DL COUNT Value Extended | O |  | COUNT Value Extended 9.2.66 | PDCP-SN and Hyper frame number for which the target eNB/en-gNB should discard forwarded DL SDUs associated with lower values in case of 15 bit long PDCP-SN | – |  |
| >>>>DISCARD DL COUNT Value for PDCP SN Length 18 | O |  | COUNT Value for PDCP SN Length 189.2.82 | PDCP-SN and Hyper frame number for which the target eNB/en-gNB should discard forwarded DL SDUs associated with lower values in case of 18 bit long PDCP-SN | – |  |

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| Range bound | Explanation |
| maxnoofBearers | Maximum no. of E-RABs. Value is 256. |

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| **Next change, ommited text not changed** |

#### 9.1.2.43 DATA FORWARDING ADDRESS INDICATION

This message is sent by the new eNB to indicate to the old eNB forwarding addresses for each E-RAB for which it admits data forwarding.

During a Conditional Handover with EN-DC or Dual Connectivity or Conditional PSCell Change, this message is also used to provide data forwarding related information. In case of EN-DC, the data forwarding related information is transferred from the eNB to the en-gNB, while in case of Dual Connectivity, the data forwarding related information is transferred from the MeNB to the SeNB.

Direction: new eNB → old eNB.

Direction: MeNB → en-gNB (Conditional Handover with EN-DC, Conditional PSCell Change), MeNB → SeNB (Conditional Handover with Dual Connectivity)

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| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| Message Type | M |  | 9.2.13 |  | YES | ignore |
| New eNB UE X2AP ID | M |  | eNB UE X2AP ID9.2.24 | Allocated at the new eNB | YES | ignore |
| New eNB UE X2AP ID Extension | O |  | Extended eNB UE X2AP ID9.2.86 | Allocated at the new eNB | YES | ignore |
| Old eNB UE X2AP ID | M |  | eNB UE X2AP ID9.2.24 | Allocated at the old eNB | YES | ignore |
| Old eNB UE X2AP ID Extension | O |  | Extended eNB UE X2AP ID9.2.86 | Allocated at the old eNB | YES | ignore |
| **E-RABs Data Forwarding Address List** |  | *1* |  |  | YES | ignore |
| **> E-RABs Data Forwarding Address Item** |  | *1 .. <maxnoofBearers>* |  |  | EACH | ignore |
| >>E-RAB ID | M |  | 9.2.23 |  | – |  |
| >>DL GTP Tunnel Endpoint | M |  | GTP Tunnel Endpoint 9.2.1 | Identifies the X2 transport bearer used for forwarding of DL PDUs | – |  |
| CHO DC Indicator | O |  | ENUMERATED (true, ...) | Indicating that the DATA FORWARDING ADDRESS INDICATION message is for a Conditional Handover. | YES | reject |
| CHO DC Early Data Forwarding Indicator | O |  | ENUMERATED (stop, ...) |  | YES | ignore |
| SgNB UE X2AP ID | O |  | en-gNB UE X2AP ID9.2.100 | Allocated for EN-DC at the en-gNB. | YES | ignore |
| CPC Indicator | O |  | ENUMERATED (triggered, executed, early data transmission stop...) | Indicating that the DATA FORWARDING ADDRESS INDICATION message is for a Conditional PSCell Change. | YES | reject |
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| Range bound | Explanation |
| maxnoofBearers | Maximum no. of E-RABs. Value is 256 |

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| **Next change, ommited text not changed** |

#### 9.1.4.2 SGNB ADDITION REQUEST ACKNOWLEDGE

This message is sent by the en-gNB to confirm the MeNB about the SgNB addition preparation.

Direction: en-gNB → MeNB.

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| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| Message Type | M |  | 9.2.13 |  | YES | reject |
| MeNB UE X2AP ID | M |  | eNB UE X2AP ID9.2.24 | Allocated at the MeNB. | YES | reject |
| SgNB UE X2AP ID | M |  | en-gNB UE X2AP ID9.2.100 | Allocated at the en-gNB. | YES | reject |
| **E-RABs Admitted To Be Added List** |  | *1* |  |  | YES | ignore |
| **>E-RABs Admitted To Be Added Item** |  | *1 .. <maxnoofBearers>* |  |  | EACH | ignore |
| >>E-RAB ID | M |  | 9.2.23 |  | – |  |
| >>EN-DC Resource Configuration | M |  | EN-DC Resource Configuration9.2.108 | Indicates the PDCP and Lower Layer MCG/SCG configuration. | – |  |
| >>CHOICE *Resource Configuration* | M |  |  |  |  |  |
| *>>>PDCP present in SN* |  |  |  | This choice tag is used if the *PDCP at SgNB* IE in the *EN-DC Resource Configuration* IE is set to the value "present". |  |  |
| >>>>S1 DL GTP Tunnel Endpoint at the SgNB | M |  | GTP Tunnel Endpoint 9.2.1 | en-gNB endpoint of the S1 transport bearer. For delivery of DL PDUs. | – |  |
| >>>>SgNB UL GTP Tunnel Endpoint at PDCP | C-ifMCGpresent |  | GTP Tunnel Endpoint 9.2.1 | en-gNB endpoint of the X2-U transport bearer at PDCP. For delivery of UL PDCP PDUs. | – |  |
| >>>>RLC Mode | C-ifMCGpresent |  | RLC Mode9.2.119 | Indicates the RLC mode. | – |  |
| >>>>DL Forwarding GTP Tunnel Endpoint | O |  | GTP Tunnel Endpoint 9.2.1 | Identifies the X2 transport bearer used for forwarding of DL PDUs | – |  |
| >>>>UL Forwarding GTP Tunnel Endpoint | O |  | GTP Tunnel Endpoint 9.2.1 | Identifies the X2 transport bearer used for forwarding of UL PDUs | – |  |
| >>>>Requested MCG E-RAB Level QoS Parameters | C-ifMCGandSCGpresent\_GBRpresent |  | E-RAB Level QoS Parameters 9.2.9 | Includes E-RAB level QoS parameters requested to be provided by the MCG. | – |  |
| >>>>UL Configuration | C-ifMCGandSCGpresent |  | 9.2.118 | Information about UL usage in the MeNB. | – |  |
| >>>>UL PDCP SN Length | O |  | PDCP SN Length9.2.133 | Indicates the PDCP SN length of the bearer for the UL. | YES | ignore |
| >>>>DL PDCP SN Length  | O |  | PDCP SN Length9.2.133 | Indicates the PDCP SN length of the bearer for the DL. | YES | ignore |
| >>>*PDCP not present in SN* |  |  |  | This choice tag is used if the *PDCP at SgNB* IE in the *EN-DC Resource Configuration* IE is set to the value "not present". |  |  |
| >>>>SgNB DL GTP Tunnel Endpoint at SCG | M |  | GTP Tunnel Endpoint 9.2.1 | SgNB endpoint of the X2-U transport bearer at the SCG. For delivery of DL PDCP PDUs. | – |  |
| >>>>Secondary SgNB DL GTP Tunnel Endpoint at SCG | O |  | GTP Tunnel Endpoint 9.2.1 | SgNB endpoint of the X2-U transport bearer at the SCG. For delivery of DL PDCP PDUs in case of PDCP duplication | – |  |
| >>>>LCID | O |  | 9.2.138 | LCID for the primary path in case of PDCP duplication | YES | ignore |
| E-RABs Not Admitted List | O |  | E-RAB List9.2.28 | A value for *E-RAB ID* shall only be present once in*E-RABs Admitted**List* IE and in *E-RABs Not Admitted List* IE. | YES | ignore |
| SgNB to MeNB Container | M |  | OCTET STRING | Includes the *CG-Config* message as defined in TS 38.331[31]. | YES | reject |
| Criticality Diagnostics | O |  | 9.2.7 |  | YES | ignore |
| MeNB UE X2AP ID Extension | O |  | Extended eNB UE X2AP ID9.2.86 | Allocated at the MeNB | YES | reject |
| Admitted split SRBs | O |  | ENUMERATED (srb1, srb2, srb1&2, ...) | Indicates admitted SRBs | YES | reject |
| SgNB Resource Coordination Information | O |  | 9.2.117 | Information used to coordinate resources utilisation between en-gNB and MeNB. | YES | ignore |
| RRC config indication | O |  | 9.2.132 | Indicates the type of RRC configuration used at the en-gNB. | YES | reject |
| Location Information at SgNB | O |  | 9.2.142 | Contains information to support localisation of the UE | YES | ignore |
| Available fast MCG recovery via SRB3 | O |  | ENUMERATED (true, ...) | Indicates the fast MCG recovery via SRB3 isenabled. | YES | ignore |
| **Conditional PSCell Addition Information Acknowledge** | O |  |  |  | YES | ignore |
| **>Candidate PSCell ID List** |  | *1* |  |  | - | - |
| **>>Candidate PSCell ID Item** |  | *1 .. <maxnoofPSCellCandidate>* |  |  | - | - |
| >>>PSCell ID | M |  | NR CGI9.2.111 |  | - | - |
| >>>RRC Container | M |  | OCTET STRING | Includes RRCConnectionReconfiguration message as defined in subclause 6.2.2 of TS 36.331[9].FFS whether single or multiple RRC containers. | - | - |

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| Range bound | Explanation |
| maxnoofBearers | Maximum no. of E-RABs. Value is 256 |
| maxnoofPSCellCandidate | Maximum no. of PSCells for CPAC. Value is FFS. |

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| Condition | Explanation |
| ifMCGpresent | This IE shall be present if, for the E-RAB admitted to be added, the *MCG resources* IE in the *EN-DC Resource Configuration* IE is set to the value "present". |
| ifMCGandSCGpresent | This IE shall be present if, for the E-RAB admitted to be added, the *MCG resources* and *SCG resources* IEs in the *EN-DC Resource Configuration* IE are set to the value "present". |
| C-ifMCGandSCGpresent\_GBRpresent | This IE shall be present if, for the E-RAB admitted to be added, the *MCG resources* and *SCG resources* IEs in the *EN-DC Resource Configuration* IE are set to the value "present", and the *GBR QoS Information* IE is present in the *Requested MCG E-RAB Level QoS Parameters* IE. |

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| **Next change, ommited text not changed** |

[ASN.1 to be added once agreed]

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| **Remaining text not changed** |