3GPP TSG-RAN WG3 #117bis-e R3-225904

Online, 10 - 18 October 2022

Agenda Item: 9.2.6

Source: NEC (moderator)

Title: Summary of Offline Discussion on CB: # 11\_PDCPCount

Document for: Approval

# Introduction

**CB: # 11\_PDCPCount**

**- Sol4 seems acceptable?**

**- Check NBC issue and provide CRs if agreeable**

(NEC - moderator)

Summary of offline disc [R3-225904](file:///D%3A%5CProgramData%5C3gpp-Ran-wg3%5C760-RAN3%23117bis-202210-E%5CDocs%5CR3-225904.zip)

The 1st round of discussion is set to deadline on **12th Oct (Wednesday)23:59 UTC.**

The 2nd round of discussion will be set to deadline on  **TBD**.

# For the Chairman’s Notes

# Discussion (1st round)

**(RAN3#116e meeting discussion refer to SOD R3-223762) (RAN3#117bis-e meeting discussion, refer to SOD R3-225000)**

If the handover involving Full Configuration, the 38.300 specifies that the PDCP SN and HFN are reset.

During the inter-gNB-DU handover, target gNB-DU may decide to generate CellGroupconfig using full configuration, the target gNB-DU indicate the Full Configuration IE as “true” in the F1AP: UE CONTEXT SETUP RESPONSE message. In this case, the PDCP COUNT (SN + HFN) will need to be reset. When the same gNB-CU-UP is kept, the gNB-CU-CP need to indicate to the gNB-CU-UP to reset the PDCP COUNT. The question is how to do that in E1AP.

**RAN3#116e** meeting some solutions were raised and discussed, resulted in the chair-minuted that:

“**For the use case of inter-DU handover that target gNB-DU has taken full configuration decision while gNB-CU decide to keep the same gNB-CU-UP that need to reset the PDCP COUNT of the existing DRBs, it is confirmed that the existing signalling with two times the E1AP: Bearer Context Modification procedures (first to release DRBs + adding the same DRBs, second to give Target DU’s DL TNL address) can work but not optimal as it take longer time to complete handover.**”

**RAN3#117e** meeting further discussed some possible solutions to reduce the handover time for the use case, which are simply to execute one time of signalling procedure instead of two times (i.e. two times the E1AP: Bearer Context Modification procedure), remaining two solutions:

**Solution 1: I**n BEARER CONTEXT MODIFICATION REQUEST message the *PDU Session Resource To Modify List* IE to release the relevant DRBs (set the *DRB To Remove List* IE)and also to setup the same DRBs (set the *DRB To Setup List* IE). Furthermore, because of the need to give the target gNB-DU’s TNL information, then need to newly add the *DL UP Parameter* IE in the *DRB To Setup List* IE.

**Solution 4: A dedicated IE to indicate reset PDCP COUNT in the *DRB to Modify List* IE.** i.e. **i**n BEARER CONTEXT MODIFICATION REQUEST message the *PDU Session Resource To Modify List* IE to introduce e.g. new *PDCP COUNT Reset* IE under the *DRB To Modify List* IE.

**In this RAN3#117bis-e meeting, two set of contributions and CRs for solution 1/ solution 4 were provided**.

**R3-225876 observes:**

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| Observation 1: Nothing is brokenObservation 2: When nothing is broken, no solution is better than a non backward compatible solutionObservation 3: To be BC, a CR also needs to be functionally BC**Observation 4: Solution 1 is NBC****Observation 5: Solution 1 is less efficient than solution 4**Observation 6: RAN3 do not have to mirror RAN2 handling of DRBs in CU-UPs |

Moderator understand that the observation 1 was identified as we already agreed in RAN3#116e in chair note.
Observation 2, 3 are always the case as backward compatible solution is always preferable.

**Moderator feel that observation 4 and 5 are key points to check, therefore would like to hear opinion from companies regarding observation 4 and observation 5 from R3-225876 :**

**Q1: Do you agree with the Observation 4 from R3-225876?**

**Observation 4: Solution 1 is NBC**

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| Company | yes/no/maybe | Comment |
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| **Moderator Summary :** |

**Q2: Do you agree with the Observation 5 from R3-225876?**

**Observation 5: Solution 1 is less efficient than solution 4**

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| Company | yes/no/maybe | Comment |
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| **Moderator Summary :** |

**R3-225368 observes:**

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| Observation and proposal : either solution 1 or solution 4 can solve the issue to reduce the handover time in the use case i.e. the inter-gNB-DU handover, when target gNB-DU generated *CellGroupConfig* using full configuration, while gNB-CU decide to keep the same gNB-CU-UP that need to reset the PDCP COUNT of the existing DRB. It is proposed to select either solution 1 or solution 4 |

**Q3: Do you agree with the observation from R3-225368 that either solution 1 or solution 4 can solve the issue to reduce the handover time?**

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| Company | yes/no/maybe | Comment |
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**Q3: R3-225876 is proposing Solution 4 (or one variant adding the IE at a different level), R3-225368 is proposing to take either solution 1 or solution 4.**

**Moderator would like to ask if you can accept Solution 4?**

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| **Moderator Summary** |

**Q4: Other points that you would like to raise and discuss, if any?**

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| Company | Comment |
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| **Moderator Summary** |

# Discussion (2nd round), if needed

# Moderator overall summary and proposal

# Conclusion, Recommendations [if needed]

If needed

# References

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| [R3-225368](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_117bis-e/Docs/R3-225368.zip) | Handling of PDCP COUNT reset in CU-UP for inter-gNB-DU Handover (NEC, ZTE, Nokia, Nokia Shanghai Bell, Intel Corporation, Rakuten Mobile Inc) | discussion |
| [R3-225369](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_117bis-e/Docs/R3-225369.zip) | Handling of PDCP COUNT reset in CU-UP for inter-gNB-DU Handover (NEC, ZTE, Huawei, CATT, Nokia, Nokia Shanghai Bell, Intel Corporation, Rakuten Mobile Inc) | CR0702r2, TS 38.463 v16.11.0, Rel-16, Cat. F |
| [R3-225370](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_117bis-e/Docs/R3-225370.zip) | Handling of PDCP COUNT reset in CU-UP for inter-gNB-DU Handover (NEC, ZTE, Huawei, CATT, Nokia, Nokia Shanghai Bell, Intel Corporation, Rakuten Mobile Inc) | CR0025r2, TS 37.483 v17.2.0, Rel-17, Cat. A |
| [R3-225371](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_117bis-e/Docs/R3-225371.zip) | PDCP COUNT reset in CU-UP for inter-gNB-DU Handover (NEC, ZTE, Ericsson, Nokia, Nokia Shanghai Bell, Intel Corporation, Rakuten Mobile Inc, Samsung) | CR0703r2, TS 38.463 v16.11.0, Rel-16, Cat. F |
| [R3-225372](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_117bis-e/Docs/R3-225372.zip) | PDCP COUNT reset in CU-UP for inter-gNB-DU Handover (NEC, ZTE, Ericsson, Nokia, Nokia Shanghai Bell, Intel Corporation, Rakuten Mobile Inc, Samsung) | CR0026r2, TS 37.483 v17.2.0, Rel-17, Cat. A |
| [R3-225876](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_117bis-e/Docs/R3-225876.zip) | PDCP Count Reset over E1AP (Ericsson) | discussion |

**Annex: 38.463v15.10.0 relevant part**

#### 9.3.3.11 PDU Session Resource To Modify List

This IE contains PDU session resource to modify related information used at Bearer Context Modification Request

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| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| **PDU Session Resource To Modify Item** |  | *1..<maxnoofPDUSessionResource>* |  |  | - | - |
| >PDU Session ID  | M |  | 9.3.1.21 |  | - | - |
| >Security Indication  | O |  | 9.3.1.23 | This IE is not used in this release. | - | - |
| >PDU Session Resource DL Aggregate Maximum Bit Rate | O |  | Bit Rate 9.3.1.20 |  | - | - |
| >NG UL UP Transport Layer Information | O |  | UP Transport Layer Information9.3.2.1 |  | - | - |
| >PDU Session Data Forwarding Information Request | O |  | Data Forwarding Information Request 9.3.2.5 | Requesting forwarding information from the target gNB-CU-UP. | - | - |
| >PDU Session Data Forwarding Information | O |  | Data Forwarding Information 9.3.2.6 | Providing forwarding information to the source gNB-CU-UP. | - | - |
| >PDU Session Inactivity Timer | O |  | Inactivity Timer 9.3.1.54 | Included if the Activity Notification Level is set to PDU Session. | - | - |
| >Network Instance | O |  | 9.3.1.62 | This IE is ignored if the *Common Network Instance* IE is included. | YES | ignore |
| >Common Network Instance | O |  | 9.3.1.66 |  | YES | ignore |
| **>DRB To Setup List** |  | *0..1* |  |  | - | - |
| **>>DRB To Setup Item**  |  | *1..<maxnoofDRBs>* |  |  | - | - |
| >>>DRB ID | M |  | 9.3.1.16 |  | - | - |
| >>>SDAP Configuration | M |  | 9.3.1.39 |  | - | - |
| >>>PDCP Configuration | M |  | 9.3.1.38 |  | - | - |
| >>>Cell Group Information | M |  | 9.3.1.11 |  | - | - |
| >>>QoS Flow Information To Be Setup  | M |  | QoS Flow QoS Parameters List9.3.1.25 |  | - | - |
| >>>DRB Data Forwarding Information Request | O |  | Data Forwarding Information Request 9.3.2.5 | Requesting forwarding information from the target gNB-CU-UP. | - | - |
| >>>DRB Inactivity Timer | O |  | Inactivity Timer 9.3.1.54 | Included if the Activity Notification Level is set to DRB. | - | - |
| >>>PDCP SN Status Information | O |  | 9.3.1.58 | Provides the PDCP SN Status at setup after Resume to the target gNB-CU-UP. | - | - |
| >>>DRB QoS  | O |  | 9.3.1.26 | Indicates the DRB QoS when more than one QoS Flow is mapped to the DRB  | YES | ignore |
| **>DRB To Modify List** |  | *0.. 1* |  |  | - | - |
| **>>DRB To Modify Item**  |  | *1..<maxnoofDRBs>* |  |  | - | - |
| >>>DRB ID  | M |  | 9.3.1.16 |  | - | - |
| >>>SDAP Configuration | O |  | 9.3.1.39 |  | - | - |
| >>>PDCP Configuration  | O |  | 9.3.1.38 |  | - | - |
| >>>DRB Data forwarding information | O |  | Data Forwarding Information 9.3.2.6 | Providing forwarding information to the source gNB-CU-UP. | - | - |
| >>>PDCP SN Status Request | O |  | ENUMERATED (requested, …) | The gNB-CU-CP requests the gNB-CU-UP to provide the PDCP SN Status in the response message. | - | - |
| >>>PDCP SN Status Information | O |  | 9.3.1.58 | Provides the PDCP SN Status to the target gNB-CU-UP. | - | - |
| >>>DL UP Parameters | O |  | UP Parameters 9.3.1.13 |  | - | - |
| >>>Cell Group To Add | O |  | Cell Group Information 9.3.1.11 |  | - | - |
| >>>Cell Group To Modify  | O |  | Cell Group Information 9.3.1.11 |  | - | - |
| >>>Cell Group To Remove  | O |  | Cell Group Information 9.3.1.11 |  | - | - |
| >>>Flow Mapping Information  | O |  | QoS Flow QoS Parameters List9.3.1.25 | Overrides previous mapping information.  | - | - |
| >>>DRB Inactivity Timer | O |  | Inactivity Timer 9.3.1.54 | Included if the Activity Notification Level is set to DRB. | - | - |
| >>>Old QoS Flow List - UL End Marker expected | O |  | QoS Flow List9.3.1.12 | Indicates that the source NG-RAN node has initiated QoS flow re-mapping and has not yet received SDAP end markers, as described in TS 38.300 [8]. | YES | reject |
| >>>DRB QoS | O |  | 9.3.1.26 | Indicates the DRB QoS when more than one QoS Flow is mapped to the DRB | YES | ignore |
| **>DRB To Remove List** |  | *0.. 1* |  |  | - | - |
| **>>DRB To Remove Item**  |  | *1..<maxnoofDRBs>* |  |  | - | - |
| >>>DRB ID  | M |  | 9.3.1.16 |  | - | - |
| >S-NSSAI | O |  | 9.3.1.9 |  | YES | reject |
| >Security Indication Modify | O |  | Security Indication9.3.1.23 |  | YES | ignore |

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| Range bound | Explanation |
| maxnoofDRBs | Maximum no. of DRBs for a UE. Value is 32. |
| maxnoofPDUSessionResource  | Maximum no. of PDU Sessions for a UE. Value is 256. |

#### 9.3.1.58 PDCP SN Status Information

This IE contains information about PDCP PDU transfer status of a DRB.

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| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| **PDCP Status Transfer UL** |  | *1* |  |  | – |  |
| >Receive Status Of PDCP SDU | O |  | BIT STRING (SIZE(1.. 131072)) | The first bit indicates the status of the SDU after the First Missing UL PDCP SDU.The Nth bit indicates the status of the UL PDCP SDU in position (N + First Missing SDU Number) modulo (1 + the maximum value of the PDCP-SN).0: PDCP SDU has not been received.1: PDCP SDU has been received correctly. | – |  |
| >UL COUNT Value | M |  | PDCP Count9.3.1.35 | PDCP-SN and Hyper Frame Number of the first missing UL SDU | – |  |
| **PDCP Status Transfer DL** |  | *1* |  |  | – |  |
| >DL COUNT Value | M |  | PDCP Count9.3.1.35 | PDCP-SN and Hyper Frame Number that the target NG-RAN node (handover) or the NG-RAN node to which the DRB context is transferred (dual connectivity) should assign for the next DL SDU not having an SN yet. | – |  |

#### 9.3.1.35 PDCP Count

This IE include the PDCP Count information.

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| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| >PDCP SN | M |  | INTEGER (0 .. ..2PDCP\_SN\_Size-1) | The PDCP SN Size is provided in the *PDCP Configuration* IE. |
| >HFN | M |  | INTEGER (0 .. 232-PDCP\_SN\_Size-1) | The PDCP SN Size is provided in the *PDCP Configuration* IE. |