3GPP TSG-RAN WG2 #109bis-e R2-20xxxxx

Electronic Meeting, April 20th – 30th 2020

Agenda Item: 5.4.1.1

Source: Ericsson

Title: Summary from [AT109bis-e][001][NR15] PDCP version change (Ericsson)

Document for: Discussion, Decision

# 1 Introduction

This document is to kick off the following email discussion:

* [AT109bis-e][001][NR15] PDCP version change (Ericsson)

Part 1: first rounds of comments, suggest decisions based on initial comments, identify whether there is need for on-line treatment. Deadline: April 23, 0700 UTC

Part 2: if agreeable, expected continuation to agree CRs.

The following three sets of papers relate to this topic:

**Set 1**

[R2-2003685](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_109bis-e/Docs/R2-2003685.zip) Clarification on PDCP version change Huawei, HiSilicon

[R2-2003686](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_109bis-e/Docs/R2-2003686.zip) Clarification on PDCP version change Huawei, HiSilicon

[R2-2003687](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_109bis-e/Docs/R2-2003687.zip) Clarification on PDCP version change Huawei, HiSilicon

[R2-2003688](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_109bis-e/Docs/R2-2003688.zip) Clarification on PDCP version change Huawei, HiSilicon

**Set 2**

[R2-2003399](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_109bis-e/Docs/R2-2003399.zip) PDCP version change with or without handover Ericsson, Intel Corporation

[R2-2003400](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_109bis-e/Docs/R2-2003400.zip) Allowing PDCP version change without handover Ericsson, Intel Corporation

[R2-2003401](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_109bis-e/Docs/R2-2003401.zip) Allowing PDCP version change without handover Ericsson, Intel Corporation

[R2-2003402](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_109bis-e/Docs/R2-2003402.zip) Allowing PDCP version change without handover Ericsson, Intel Corporation

[R2-2003405](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_109bis-e/Docs/R2-2003405.zip) Allowing PDCP version change without handover Ericsson, Intel Corporation

**Set 3**

[R2-2002987](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_109bis-e/Docs/R2-2002987.zip) TS 36.331 Clarifying the options for PDCP version change Nokia, Nokia Shanghai Bell

[R2-2002988](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_109bis-e/Docs/R2-2002988.zip) TS 37.340 Clarifying the options for PDCP version change Nokia, Nokia Shanghai Bell

# 2 Background

The issue of PDCP version change between LTE and NR PDCP has been discussed in the past few RAN2 meetings. Due to an ambiguity in the specifications, companies had different understandings of whether PDCP version could be changed with or without handover.

When this ambiguity was discovered companies originally proposed CRs to:

1. Force all UEs to support PDCP version change without handover

2. Forbid PDCP version change without handover

The proponents of 1 assumed that the specification already allowed PDCP version change without handover, hence arguing that the ambiguity in the specification shall be resolved by making it clear that PDCP version change without handover is allowed.

Other companies argued that 1 would not be backwards compatible as there may be UEs in the field which assumes that PDCP version change is never be performed without a handover or fullConfig. Hence these companies proposed CRs forbidding this, i.e. 2.

# 3 Discussion

Based on the interpretation of the rapporteur of this email discussion there seem like no company proposing option 1 any longer. Instead we have these two options on the table in this meeting:

2. Forbid PDCP version change without handover

3. Add a UE capability bit indicating if PDCP version change without handover is supported

First, it is suggested that companies agree on which proposals are still open for discussion to ensure that there is no fourth solution which has been missed.

**Q1: Do you agree that only option 2 and 3 above are on the table? If "no", please elaborate in the comment-field.**

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| --- | --- | --- |
| Company | Yes/No | Comments |
| Ericsson | Yes |  |
| Nokia | No, we found already some proof in the specifications why version change with and without HO are already supported in today’s specification. | PDCP version change via Case 1) in our paper “RRCConnectionReconfiguration including DRB release and add and NOT including mobilityControlInfo)” should anyway be allowed in following cases:  **Scenario 1:** TS37.340 8.3 “One step (direct) bearer type change with PDCP version change (only applicable for EN-DC) is supported.” --> This already is possible without HO   * We think it’s true at least in case of associated bearer PDCP termination point change (i.e. with different Security Key to avoid security issue)   **Scenario 2** TS37.340 4.2.1 “for the initial change of SRB1 from E-UTRA PDCP to NR PDCP, with a reconfiguration without mobility before the initial security activation”   * HO is neither possible nor necessary since security is not yet activated (i.e. no security issue at this time point).   **Scenario 3:** PDCP version change w/ different DRB ID w/ HO or full config  NOTE (about security key issue): 3gpp mandates {DRB ID, Security Key, PDCP SN } shall not be repeated for UL/DL data transmission. See TS36.331 5.3.1.2 “The eNB is responsible for avoiding reuse of the COUNT with the same RB identity and with the same KeNB, e.g. due to …, release and establishment of new RBs, …”  i.e. it implies technically,  o PDCP version change with same DRB ID w/o HO or fullConfig is already possible, if it’s associated with bearer termination point change (i.e. security key change); e.g. change from MN terminated MCG LTE PDCP to SN terminated split NR PDCP.  o PDCP version change with same DRB ID w/o HO or fulfConfig is NOT possible, if associated bearer termination point is unchanged (i.e. w/o security key change). e.g. change from MN terminated MCG LTE PDCP to MN terminated MCG NR PDCP. |
| Qualcomm Incorporated | Yes | Given the positions expressed by companies, we think those options are possible ways out.  In our view, it is not worthwhile at this stage to discuss what is clear or unclear in the current standard. |
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The proponents of option 3 suggests that there is a benefit of allowing PDCP version change without handover as a handover can be avoided and hence unnecessary interruption and signalling can be avoided. It would however require that RAN2 introduces a bit in UE capability signalling.

**Q2: Which of option 2 and 3 should be adopted? Please provide reasoning in the comment-field.**

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| --- | --- | --- |
| Company | 2 or 3 | Comments |
| Ericsson | 3 | We think small cost of a capability bit is justified considering that handovers can be avoided hence avoiding interruptions and unnecssary random access-procedures can be avoided. |
| Nokia | Neither of the options | As discussed above there are already scenarios today where the specification supports PDCP version change with/without HO with DRB rel/add. |
| Qualcomm Incorporated | 3 | This looks like a good compromise. |
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Companies are invited to provide any other input they might have on this issue.

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| Company | Comments |
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# 3 Conclusion

**TBD**

# 4 References