3GPP TSG-RAN WG2 Meeting #115 Electronic R2-21xxxxx

Elbonia, 16 – 27 August 2021

**Agenda item: 6.1.3.2**

**Source: Nokia, Nokia Shanghai Bell**

**Title: Report of [AT115-e][022][NR16] RLC & PDCP (Nokia)**

**Document for: Discussion and Decision**

# 1 Introduction

This is the summary of the following email discussion in RAN2#115-e meeting.

* [AT115-e][022][NR16] RLC & PDCP (Nokia)

Scope: Determine agreeable parts and agree CRs, Treat R2-2108248, R2-2108249, R2-2108247, R2-2107662, R2-2107665

Intended outcome: Report, Agreed CRs.

Deadline: Schedule 1

# 2 Contact information

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| --- | --- |
| Company | Contact: Name (E-mail) |
| Nokia, Nokia Shanghai Bell | Samuli Turtinen (samuli.turtinen@nokia.com) |
| Samsung | Donggun Kim (s\_dg.kim@samsung.com) |
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# 3 Discussion

## 3.1 RLC

[R2-2108249](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_115-e\Docs\R2-2108249.zip) Retransmission conditions upon expiry of t-PollRetransmit Nokia, Nokia Shanghai Bell CR Rel-16 38.322 16.2.0 0044 - F TEI16

**Reason for change:**

Currently, upon expiry of t-PollRetransmit, the transmitting side of an AM RLC entity shall:

- if both the transmission buffer and the retransmission buffer are empty (excluding transmitted RLC SDU or RLC SDU segment awaiting acknowledgements); or

- if no new RLC SDU or RLC SDU segment can be transmitted (e.g. due to window stalling):

- consider the RLC SDU with the highest SN among the RLC SDUs submitted to lower layer for retransmission; or

- consider any RLC SDU which has not been positively acknowledged for retransmission.

The intention is that when there is no AMD PDU queued for transmission that can naturally carry the re-sent poll, one is artificially created by considering a non-ACKed SDU for retransmission.

The current text implements this intention incorrectly: because the second condition (no new RLC SDU or RLC SDU segment can be transmitted) is now sufficient on its own, an SDU will artifically be considered for retransmission based on the second condition even if the retransmission buffer is non-empty.

**Solution:**

In the actions upon expiry of t-PollRetransmit, re-word the conditions for considering for retransmission a non-ACKed SDU to “if the retransmission buffer is empty (excluding transmitted RLC SDU or RLC SDU segment awaiting acknowledgements) and no new RLC SDU or RLC SDU segment can be transmitted (e.g. due to empty transmission buffer or window stalling)”.

**Q1: Comments on the issues and the solution of CR in R2-2108249?**

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| --- | --- | --- | --- |
| Company | Agree issue/Disagree issue | Agree solution/Disagree solution/  Agree with modification | Detailed Comments |
| Samsung | Disagree | Disagree  (Any solution is not needed.) | Our understanding is that the current specification is correct. Each condition covers different cases. We cannot combine two conditions but should keep two conditions, separately.  The first condition specifies the case that there is indeed no new data in the transmission buffer and retransmission buffer while the second condition specifies the case that there is new data in the transmission buffer or retransmission buffer but new transmission is not allowed due to window stalling.  That’s why we have two separate conditions in the current specifications.  If these two conditions are combined with “and” condition as this CR proposed, then we cannot cover the latter case. |
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[R2-2108247](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_115-e\Docs\R2-2108247.zip) Retransmission conditions upon expiry of t-PollRetransmit Nokia, Nokia Shanghai Bell CR Rel-16 36.322 16.0.0 0147 - F TEI16

The first issue in this CR is the same issue as above R2-2108249 but for LTE:

**Reason for change:**

1. Currently, upon expiry of t-PollRetransmit, the transmitting side of an AM RLC entity shall:

- if both the transmission buffer and the retransmission buffer are empty (excluding transmitted RLC data PDU awaiting for acknowledgements); or

- if no new RLC data PDU can be transmitted (e.g. due to window stalling):

- consider the AMD PDU with SN = VT(S) – 1 for retransmission; or

- consider any AMD PDU which has not been positively acknowledged for retransmission;

The intention is that when there is no RLC Data PDU queued for transmission that can naturally carry the re-sent poll, one is artificially created by considering a non-ACKed AMD PDU for retransmission.

The current text implements this intention incorrectly: because the second condition (no new RLC data PDU can be transmitted) is now sufficient on its own, an AMD PDU will artifically be considered for retransmission based on the second condition even if the retransmission buffer is non-empty.

2. “await for acknowledgements” is not correct language. “For” is not used with “await”. In 38.322 this is already corrected.

3. Rudundant space in a Note: “E mpty”.

**Solution:**

1. In the actions upon expiry of t-PollRetransmit, re-word the conditions for considering for retransmission a non-ACKed AMD PDU to “if the retransmission buffer is empty (excluding transmitted RLC data PDU awaiting acknowledgements) and no new RLC data PDU can be transmitted (e.g. due to empty transmission buffer or window stalling)”.
2. Occurrences of “awaiting for acknowledgements” changed to “awaiting acknowledgements”.
3. “E mpty” corrected to “Empty”.

**Q2: Comments on the issues and the solution of CR in R2-2108247?**

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| --- | --- | --- | --- |
| Company | Agree issue/Disagree issue | Agree solution/Disagree solution/  Agree with modification | Detailed Comments |
| Samsung | Disagree | Disagree  (Any solution is not needed.) | Our understanding is that the current specification is correct. Please see our response for Q1.  However, the editorial change 2) and 3) are acceptable to us. 2) may not be needed, actually. |
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[R2-2108248](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_115-e\Docs\R2-2108248.zip) Conditions for incrementing RETX\_COUNT Nokia, Nokia Shanghai Bell CR Rel-16 38.322 16.2.0 0043 - F TEI16

**Reason for change:**

The current specification contains:

When an RLC SDU or an RLC SDU segment is considered for retransmission, the transmitting side of the AM RLC entity shall:

- if the RLC SDU or RLC SDU segment is considered for retransmission for the first time:

- set the RETX\_COUNT associated with the RLC SDU to zero.

- else, if it (the RLC SDU or the RLC SDU segment that is considered for retransmission) is not pending for retransmission already and the RETX\_COUNT associated with the RLC SDU has not been incremented due to another negative acknowledgment in the same STATUS PDU:

- increment the RETX\_COUNT.

1. When, due to one given Status PDU received, (parts of) a given SDU is considered for retransmission for the first time and for the second time, by the current specification text RETX\_COUNT associated with the SDU is first set to 0 and the inremented to 1, which is not the intention. This is because the initial setting of RETX\_COUNT to zero does not count as “incrementing” it, since RETX\_COUNT is never negative.
2. RAN2#113bis-e agreed that RETX\_COUNT is updated also when an SDU is considered for retransmission due to expiry of t-PollRetransmit. The wording “in the same STATUS PDU” alone gives the wrong impression that Status PDU is the sole reason for updating RETX\_COUNT.

**Solution:**

1. “RETX\_COUNT … incremented” replaced with “value of RETX\_COUNT … modified”;
2. “in the same STATUS PDU” is made subject to the assumption that the RLC SDU or the RLC SDU segment is considered for retransmission due to a STATUS PDU received.

**Q3: Comments on the issues and the solution of CR in R2-2108248?**

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| --- | --- | --- | --- |
| Company | Agree issue/Disagree issue | Agree solution/Disagree solution/  Agree with modification | Detailed Comments |
| Samsung | Disagree | Disagree  (Any solution is not needed.) | Our understanding is that the current specification is correct.  In the early stage of NR, we designed RETX\_COUNT value based on the principle that it is incremented at most once per status PDU. That’s why we have the text “the same STATUS PDU” in the second condition.  This CR raised up two issues. The first issue is that RETX\_COUNT value may be incremented twice when STATUS PDU is received. But that is not true. If we look into the procedure, we have “else if” condition. So if the first condition is satisfied, then we skip the next condition. So RETX\_COUNT value will not be incremented twice.  The second issue is that RETX\_COUNT value should be updated if an SDU is considered for retransmission due to the expiry of t-PollRetransmit timer. The reason for the expiry of timer is that the AM RLC entity has not received STATUS PDU so there is no STATUS PDU there. In this reason, if we look into the current specification again, the RETX\_COUNT value will be updated as we agreed.  So, the current spec will work as intended. |
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## 3.2 PDCP

[R2-2107662](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_115-e\Docs\R2-2107662.zip) CR for LTE PDCP operation after DAPS release Samsung CR Rel-16 36.323 16.3.0 0296 - F NR\_Mob\_enh-Core

**Reason for change:**

In LTE, the PDCP operation is explicitly clarified in both cases that split bearer/LWA bearer is configured and it is re-configured to normal DRB in Section 5.1.2.1.4.

However, for DAPS handover, the LTE PDCP operation is specified only for the case that PDCP entity is reconfigured to configure DAPS and thus it is not clear which PDCP operation would be performed in the case that PDCP entity is reconfigured to release DAPS.

**Solution:**

To clarify the LTE PDCP operation in the case that PDCP entity is reconfigured to release DAPS.

**Q4: Comments on the issues and the solution of CR in R2-2107662?**

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| Company | Agree issue/Disagree issue | Agree solution/Disagree solution/  Agree with modification | Detailed Comments |
| Samsung (Proponent) | Agree | Agree |  |
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[R2-2107665](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_115-e\Docs\R2-2107665.zip) CR for the ciphering of EHC header Samsung CR Rel-16 38.323 16.4.0 0080 - F NR\_IIOT-Core

**Reason for change:**

In RAN2#107bis, RAN2 made the following agreements:

* The EHC function is in PDCP
* The EHC header is located after the SDAP header, and it is ciphered

However, the current PDCP specification does not capture that the EHC header is ciphered.

In Rel-15 LTE UDC, the similar issue, i.e. the UDC header is ciphered, was specified as follows:

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| 5.6 Ciphering and Deciphering5.6.0 General The ciphering function includes both ciphering and deciphering and is performed in PDCP. For the control plane, the data unit that is ciphered is the data part of the PDCP PDU (see clause 6.3.3) and the MAC-I (see clause 6.3.4). For the user plane, the data unit that is ciphered is the data part of the PDCP PDU (see clause 6.3.3); ciphering is not applicable to PDCP Control PDUs. 6.3.3 Data Length: Variable  The Data field may include either one of the following:  - Uncompressed PDCP SDU (user plane data, or control plane data); or  - Compressed PDCP SDU (user plane data only); or  - UDC header and UDC Data Block if UDC is configured. |

Given that Rel-17 NR UDC would be considered, the similar way is preferred for the ciphering of EHC header.

**Solution:**

To add a text “EHC header and compressed PDCP SDU if EHC is configured” to Section 6.3.3 to clarify that EHC header is ciphered.

**Q5: Comments on the issues and the solution of CR in R2-2107665?**

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| Company | Agree issue/Disagree issue | Agree solution/Disagree solution/  Agree with modification | Detailed Comments |
| Samsung (Proponent) | Agree | Agree |  |
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# 4 Conclusion

TBD