**3GPP TSG-WG2 #**

**, Malta, 19 - 23 May 2025**

**Agenda item: 8.4.1**

**Source: Apple**

**Title: Collection of comments and Open issues to 38.321 CR for LP-WUS**

**WID/SID: NR\_LPWUS-Core – Release 19**

**Document for: Discussion and Decision**

# 1 Introduction

This is a summary document on collection of comments to TS 38.321 CR for LP-WUS during below running CR discussion:

* [Post129bis][210][LPWUS] Running CR for TS 38.321 (Apple)

Intended outcome: Running CR for submission to the next meeting

Deadline: Long

# 2 Collection of comments

Please provide your comments in below table, and Rapporteur will response. Please do not insert any comments in running CR directly, which is hard for Rapporteur to follow all comments.

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| **Company** | **Detailed comments** | **Rapporteur response** |
| OPPO | Thanks Fangli for handling this Email discussion. Two comments from my side:  1st: the following branch, i.e., LP-WUS Option 1-1 is not correct, because not configuring lpwus\_PDCCHMonitoringTimer means either LP-WUS 1-1 OR LP-WUS does not configured at all.  2> else if the *lpwus\_PDCCHMonitoringTimer* is not configured (i.e., LP-WUS Option 1-1):  I guess, the following 2nd level branch should not be removed, as the reason given above. Instead, the 3rd level branch should be removed.  2nd: the following 2nd level branch condition is duplicated with the 1st level branch, thus suggest to remove.  1> if LP-WUS monitoring is configured and the *lpwus\_PDCCHMonitoringTimer* for this DRX group is configured (i.e., LP-WUS Option 1-2):  2> if *lpwus\_PDCCHMonitoringTimer* is configured (i.e., LP-WUS Option 1-2):  3rd: do we have the agreement that the new timer applies to each DRX group or it’s common for both?  2> stop *lpwus\_PDCCHMonitoringTimer* for each DRX group*.* | > For 1st comment  Addressed according to the suggestion in C001.  > For 2nd Comment  Addressed.  > For 3rd Comment  It’s the open issue for further discussion, which is captured in the following EN in the running CR.  Editor’s NOTE: FFS whether/how to support LP-WUS (including Option 1-1 and 1-2) and dual DRX group. |
| CATT | C001  1> if the Long DRX cycle is used for a DRX group and the *drx-NonIntegerLongCycleStartOffset* is configured, and floor([(*DRX\_SFN\_COUNTER* × 10240) + (SFN × 10) + subframe number] modulo (*drx-NonIntegerLongCycle*)) = *drx-StartOffset*:  2> if DCP monitoring is configured for the active DL BWP as specified in TS 38.213 [6], clause 10.3:  /omitted/  2> else if the *lpwus\_PDCCHMonitoringTimer* is not configured (i.e., LP-WUS Option 1-1):  3> if LP-WUS monitoring is configured as specified in TS 38.213 [6], clause 10.X:  [CATT]We think above branch can be simply that LP-WUS is configured. And Option 1-1 is moved under the branch that LP-WUS is configured to indicate Option 1-1, which is shown below:  2> else if LP-WUS monitoring is configured as specified in TS 38.213 [6], clause 10.X:  3> if the *lpwus\_PDCCHMonitoringTimer* is not configured (i.e., LP-WUS Option 1-1):  /omitted/  3> else:  4> start *drx-onDurationTimer* for this DRX group after *drx-SlotOffset* from the beginning of the subframe.  [CATT]This can the branch that neigher DCP nor LP-WUS is configured, which can be changed as following:  2> else:  3> start drx-onDurationTimer for this DRX group after drx-SlotOffset from the beginning of the subframe.  C002  For the following text highlighted in yellow, we share the same view as OPPO that it is duplicated for *lpwus\_PDCCHMonitoringTimer* configuration. One of the conditions can be removed.  1> if LP-WUS monitoring is configured and the *lpwus\_PDCCHMonitoringTimer* for this DRX group is configured (i.e., LP-WUS Option 1-2):  2> if *lpwus\_PDCCHMonitoringTimer* is configured (i.e., LP-WUS Option 1-2): | > C001  Addressed.  > C002  Addressed. |
| Ericsson | E001  Similar comments as OPPO and CATT above about “Not LP-WUS Option 1-2” branch. Suggest to consider using e.g. if neither *lpwus-Offset11* nor *lpwus-Offset12* is configured:  E002  Use more descriptive names instead of option 1-1 and option 1-2. For example: e.g. *lpwus-BeforeOnDuration*and *lpwus-Periodically* or *lpwus-WithOnDurationTimer* and *lpwus-WithPDCCH-MonitoringTimer*.  E003  Suggest to refer to 38.331 w.r.t. configuration and 38.213 w.r.t. LP-WUS indication:  3> if LP-WUS-config is present:  4> if LP-WUS indication associated with the current DRX cycle received from lower layer indicated to start *drx-onDurationTimer*, as specified in clause 10.X in TS 38.213 [6]; or  Editorial: italic lpwus\_PDCCHMonitoringTimer | > E001  Addressed. The change is according to CATT’s suggestion.  > E002  About the term “LP-WUS Option 1-1, and Option 1-2”, as the term is also used in other running CRs, let’s keep it as it is for now, and we can update it later for all CRs.  > E003  For DCP feature, we use the description as “DCP monitoring is configured…” . So for LPWUS feature, we can use the style, i.e. “LP-WUS monitoring is configured….”  > E004  All timer used in the spec is updated to italic. |
| Sharp | We understand the intention is both DCPparameter and LP-WUS parameterare not configured with value *true*, UE doesn’t report periodic CSI. Sugget to change as follow:  3> if neither *ps-TransmitPeriodicL1-RSRP* ~~or~~nor *lpwus-TransmitPeriodicL1-RSRP* is ~~not~~ configured with value *true*:  4> not report periodic CSI that is L1-RSRP on PUCCH.  3> if neither *ps-TransmitOtherPeriodicCSI* ~~or~~nor *lpwus-TransmitOtherPeriodicCSI* is ~~not~~ configured with value *true*:  4> not report periodic CSI that is not L1-RSRP on PUCCH. | Addressed. |
| NEC | **Comment-1:**  Based on OPPO and CATT comments above, we understand that:  If we remove the brackets part below, the logic is right then:  2> else if the lpwus\_PDCCHMonitoringTimer is not configured:  It means this branch can include LP-WUS option 1-1 and normal case (i.e., non-DCP and non-LP-WUS).  However we think the CATT solution is more preferred, it could be more clear if we exchange the order and the below one is not removed (prefer there is one bullet 2> for normal case)  **Comment-2:**  Share same view as OPPO, it is overlapping for the following:  1> if LP-WUS monitoring is configured and the *lpwus\_PDCCHMonitoringTimer* for this DRX group is configured (i.e., LP-WUS Option 1-2):  2> if *lpwus\_PDCCHMonitoringTimer* is configured (i.e., LP-WUS Option 1-2):  **Comment-3:**  For potential collision, we have agreement:  Working assumption for the case of potential collision (if any): In Option 1-1, when the UE is not able to monitor the LP-WUS occasion(s) the UE should start the drx-OnDurationTimer (as if LP-WUS was detected). FFS for Option 1-2.  For LP-WUS option 1-1, LP-WUS occasion occurred in Active Time (which means the UE is not able to monitor LP-WUS) belongs to one of collision cases, and is captured as below:  4> if all LP-WUS monitoring occasion(s) in time domain, as specified in TS 38.213 [6], associated with the current DRX cycle occurred in Active Time considering…  5> start *drx-onDurationTimer* after *drx-SlotOffset* from the beginning of the subframe.  However for option 1-2, since we have FFS in the agreement, suggest to add one Editor’s NOTE for opt 1-2 collision case. | > Comment-1  Addressed according to CATT’s suggestion.  > Comment-2  Addressed.  > Comment-3  Add the following new EN to capture the FFS for Option 1-2 for collision case.  Editor’s NOTE: FFS in Option 1-2 whether the UE should start the *lpwus\_PDCCHMonitoringTimer* (as if LP-WUS was detected) when the UE is not able to monitor the LP-WUS occasion(s). |
| Huawei | Agree with CATT’s comment, and NEC Comment-3, it can also be listed as an open issue.  One comment on ASN.1 naming:  lpwus\_PDCCHMonitoringTimer ->  lpwus\_PDCCH-MonitoringTimer | Addressed  For ASN.1 naming, let’s do the work after the configuration and name used in RRC running CR is stable. |
| Lenovo | Len001:  1> if LP-WUS monitoring is configured and the *lpwus\_PDCCHMonitoringTimer* for this DRX group is configured (i.e., LP-WUS Option 1-2):  2> if *lpwus\_PDCCHMonitoringTimer* is configured (i.e., LP-WUS Option 1-2):  2> if LP-WUS indication is received from lower layer indicated to start lpwus\_PDCCHMonitoringTimer, as specified in TS 38.213 [6]:  3> start lpwus\_PDCCHMonitoringTimer from the beginning of the subframe indicated from lower layer.   1. Same comment with C002, the highlighted part on the condition of ‘if lpwus\_PDCCHMonitoringTimer is configured’ seems duplicated. 2. According to RAN2bis agreements: Working assumption for the case of potential collision (if any): In Option 1-1, when the UE is not able to monitor the LP-WUS occasion(s) the UE should start the drx-OnDurationTimer (as if LP-WUS was detected). FFS for Option 1-2.   Suggest adding related editor’s note: FFS on other cases is needed to start *lpwus\_PDCCHMonitoringTimer.* | > Len001  Addressed.  > Len002  Add the new EN to capture the FFS. |
| vivo | V001:  2> else if the *lpwus\_PDCCHMonitoringTimer* is not configured (i.e., LP-WUS Option 1-1):  3> if LP-WUS monitoring is configured as specified in TS 38.213 [6], clause 10.X:  V002: same as C002 and corresponding OPPO comments. | > V001  Addressed according to CATT’s suggestion.  > V002  Addressed. |
| InterDigital | I001:  For the following addition  1> if the *lpwus\_PDCCHMonitoringTimer* is not configured (i.e., Not LP-WUS Option 1-2):  2> if the Short DRX cycle is used for a DRX group and the drx-NonIntegerShortCycle is not configured, and [(SFN × 10) + subframe number] modulo (drx-ShortCycle) = (drx-StartOffset) modulo (drx-ShortCycle); or  2> if the Short DRX cycle is used for a DRX group and the drx-NonIntegerShortCycle is configured, and floor([(DRX\_SFN\_COUNTER × 10240) + (SFN × 10) + subframe number − drx-StartOffset] modulo (drx-NonIntegerShortCycle)) = 0:  3> start drx-onDurationTimer for this DRX group after drx-SlotOffset from the beginning of the subframe.  Samuli: Similarly to implementation with Long DRX cycle, we would prefer the UE does the Short DRX cycle calculation and the condition is only added for starting the *drx-onDurationTimer*, ie.:  1> if the Short DRX cycle is used for a DRX group and the drx-NonIntegerShortCycle is not configured, and [(SFN × 10) + subframe number] modulo (drx-ShortCycle) = (drx-StartOffset) modulo (drx-ShortCycle); or  1> if the Short DRX cycle is used for a DRX group and the drx-NonIntegerShortCycle is configured, and floor([(DRX\_SFN\_COUNTER × 10240) + (SFN × 10) + subframe number − drx-StartOffset] modulo (drx-NonIntegerShortCycle)) = 0:  2> if the *lpwus\_PDCCHMonitoringTimer* is not configured (i.e., Not LP-WUS Option 1-2):  3> start drx-onDurationTimer for this DRX group after drx-SlotOffset from the beginning of the subframe.  I002:  Samuli: Agree with vivo’s V001, however, I think we should also remove the “i.e.,” references from the eventual specification but can keep them for clarification in the running CR.  I003:  Samuli: Agree with Sharp’s comment, would be clearer to write “neither .. nor”. | > I001  Addressed.  > I002  Addressed according to CATT’s suggestion.  > I003  Addressed. |
| Nokia | **N001**: We also have the same view as NEC Comment-1 although the structure seems to be correct if "(i.e., LP-WUS Option 1-1)" is removed. In the end, we think the 'option 1-1' or 'option 1-2' should be removed from the specification.  **N002**: Whether/How to support secondary DRX is still FFS. If supported, it also needs to be discussed whether *lpwus-PDCCHMonitoringTimer* is per DRX group or common. Thus, the below should be captured when relevant agreement is made:  1> if a DRX Command MAC CE indicated by PDCCH addressed to C-RNTI or CS-RNTI, or by a configured downlink assignment for unicast transmission or a Long DRX Command MAC CE is received:  2> stop *drx-onDurationTimer* for each DRX group;  2> stop *drx-InactivityTimer* for each DRX group;  2> stop *lpwus\_PDCCHMonitoringTimer* for each DRX group*.*  1> if LP-WUS monitoring is configured and the *lpwus\_PDCCHMonitoringTimer* for this DRX group is configured (i.e., LP-WUS Option 1-2):  2> if *lpwus\_PDCCHMonitoringTimer* is configured (i.e., LP-WUS Option 1-2):  2> if LP-WUS indication is received from lower layer indicated to start lpwus\_PDCCHMonitoringTimer, as specified in TS 38.213 [6]:  3> start lpwus\_PDCCHMonitoringTimer from the beginning of the subframe indicated from lower layer. | > N001  Addressed according to CATT’s suggestion.  “Option 1-1/1-2” can be removed in the final version.  > N002  It’s open issue and already reflected in the EN.  Editor’s NOTE: FFS whether/how to support LP-WUS (including Option 1-1 and 1-2) and dual DRX group. |

# 2 Open issue list

Followings are the Editor’s NOTE in the running CR.

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| Editor’s NOTE: The terminology for LP-WUS may be further updated to align with other specifications.  Editor’s NOTE: The parameter name may be further updated to align with the name used in RRC specification.  Editor’s NOTE: FFS whether the maintenance of *lpwus\_PDCCHMonitoringTimer* is per DRX group or per MAC entity.  Editor’s NOTE: FFS whether/how to support LP-WUS (including Option 1-1 and 1-2) and dual DRX group.  Editor’s NOTE: FFS whether *lpwus\_PDCCHMonitoringTimer* is configured per DRX group or common to DRX groups.  Editor’s NOTE: The DRX operation in LP-WUS Option 1-1 takes DCP description as baseline.  Editor’s NOTE: The LP-WUS based DRX model is that LP-WUS monitoring and sending LP-WUS indication (together with the timepoint to start timer in Option 1-2) to MAC is captured in RAN1 spec (38.213), and the DRX operation based on the LP-WUS indication is captured in MAC spec.  Editor’s NOTE: The relationship between UE's LP-WUS monitoring and DRX active time is assumed to be reflected in RAN1 spec (38.213), so we will not capture this part in MAC spec. |

Amongst the EN, there is only one MAC specific open issue that needs further discussion, as follows:

**Open issue 1: Whether/How to support the LP-WUS (including Option 1-1 and 1-2) and dual DRX group.**

In addition to the above Open issue 1, please provide your comments on any other MAC specific open issues, and Rapporteur will response.

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| **Company** | **Open issue** | **Rapporteur response** |
| NEC | Previously we have agreement for CSI reporting:   * For Option 1-2, network can configure whether UE reports periodic CSI/L1-RSRP during the time given by the configured drx-onDurationTimer, for the case when UE is outside C-DRX active time.   Besides drx-onDurationTimer, we introduced another lpwus\_PDCCHMonitoringTimer, and this Active Timer could not be started if LP-WUS is not detected, suggest to consider the relationship between this new Active Timer and CSI reporting (this is just refer to DCP mechanism).  [vivo] I understand this has been already captured in MAC, i.e. DRX active time include the case that this time is running. | It’s already captured in MAC running CR.  Case 1:  When UE starts lpwus\_PDCCHMmonitoringTimer triggered by the LP-WUS indication.  > UE is in DRX active time when lpwus\_PDCCHMmonitoringTimer is running  > UE’s operation for CSI reporting in DRX active time is as legacy.  Case 2:  When UE doesnot receive LP-WUS indication and is outside DRX active time  > If *lpwus-TransmitOtherPeriodicCSI*  / *lpwus-TransmitPeriodicL1-RSRP* is configured, UE can report CSI/L1-RSRP during onduration. |
| Huawei | Based on the conclusion in RAN2#129bis meeting:  Working assumption for the case of potential collision (if any): In Option 1-1, when the UE is not able to monitor the LP-WUS occasion(s) the UE should start the drx-OnDurationTimer (as if LP-WUS was detected). FFS for Option 1-2.  One open issue can be:  In Option 1-2, when the UE is not able to monitor the LP-WUS occasion(s), whether/how the UE starts the *lpwus\_PDCCHMonitoringTimer*.  [vivo] agree with HW. This issue should be added to wait for more RAN1 progress. | Agree with vivo.  This is one open issue, but since RAN1 will discuss it based on RAN2 LS (R2-2503187), RAN2 can wait for RAN1's reply. |
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# 3 Conclusion

Based on post-meeting email discussion, Rapporteur identify the following stage 3 open issues:

**Open issue 1: Whether/How to support the LP-WUS (including Option 1-1 and 1-2) and dual DRX group.**

**Open issue 2: In Option 1-2, whether the UE should start the lpwus\_PDCCHMonitoringTimer (as if LP-WUS was detected) when the UE is not able to monitor the LP-WUS occasion(s).**