**3GPP TSG RAN WG2 Meeting #129 R2-250xxxx  
 Wuhan, China, 7th - 11th April 2025**

**Agenda item: 8.4.1**

**Source: Apple**

**Title: Collection of comments 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:

* [Post129][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.

And based on existing EN and your comments, Rapporteur will identify stage 3 open issues.

|  |  |  |
| --- | --- | --- |
| **Company** | **Detailed comments** | **Rapporteur response** |
| NEC | LP-WUS Low-Power Wake-Up Signal  **Comment-1: seems like different spec use different term, e.g., in TS 38.304 running CR, it is Low Power-Wake Up Signal, need to align in the end.**  - lpwus\_PDCCHMonitoringTimer (Optional): the duration after the LP-WUS occasion in which a LP-WUS indicates the UE's PDCCH monitoring activity for the MAC entity.  **Comment-2: for the name definition, RAN2 has not decided yet. In our understanding, the definition of active time is broader than that of PDCCH timer (e.g., CSI reporting can be done in active time including this new timer I believe). Therefore we prefer to name it as *drx-onDurationTimer-LPWUS* (e.g., just referred from MBS).**  1> if LP-WUS monitoring is configured and no DRX group is in Active Time:  <omit>  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…  **Comment-3: I am not sure if we specify [no DRX group is in active time] in 1>, do we still need 4> ?**  **Suggest to remove [no DRX group is in active time] in 1>, the clarification for LP-WUS monitoring outside active time can be reflected in other part or spec.**  2> if lpwus\_PDCCHMonitoringTimer is configured (i.e., LP-WUS Option 1-2):  3> if LP-WUS indication is received from lower layer indicated to start lpwus\_PDCCHMonitoringTimer, as specified in TS 38.213 [6]:  4> start lpwus\_PDCCHMonitoringTimer from the beginning of the subframe indicated from lower layer.  **Comment-4: do we need to consider what if LP-WUS (opt 1-2) occasion occurred in active time (just refer to LP-WUS opt 1-1)?** |  |
| Xiaomi | 1> if LP-WUS monitoring is configured and no DRX group is in Active Time:  …  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 grants/assignments/DRX Command MAC CE/Long DRX Command MAC CE received and Scheduling Request sent until 4 ms prior to start of the last LP-WUS occasion, or during a measurement gap, or when the MAC entity monitors for a PDCCH transmission on the search space indicated by recoverySearchSpaceId of the SpCell identified by the C-RNTI while the ra-ResponseWindow is running (as specified in clause 5.1.4):  5> start drx-onDurationTimer after drx-SlotOffset from the beginning of the subframe.  **Comment 1:** we also think the above two parts are contradicting with each other. Maybe remove one of those.  On the other hand, we think it is still unclear for option 1-1 whether UE still monitors LP-WUS during DRX active time/during measurement gap/will RAR window running.  **Comment 2:** there are some occurrences of lpwus\_PDCCHMonitoringTimer with/without “for the DRX group”. Better to align, i.e. add “for the DRX group” |  |
| Huawei, HiSilicon | Serving Cells of a MAC entity may be configured by RRC in two DRX groups with separate DRX parameters. When RRC does not configure a secondary DRX group, there is only one DRX group and all Serving Cells belong to that one DRX group. When two DRX groups are configured, each Serving Cell is uniquely assigned to either of the two groups. The DRX parameters that are separately configured for each DRX group are: *drx-onDurationTimer*, *drx-InactivityTimer*. The DRX parameters that are common to the DRX groups are: *drx-SlotOffset*, *drx-RetransmissionTimerDL*, *drx-RetransmissionTimerUL*, *drx-LongCycleStartOffset*, *drx-NonIntegerLongCycleStartOffset*, *drx-ShortCycle* (optional), *drx-NonIntegerShortCycle* (optional), *drx-ShortCycleTimer* (optional), *drx-HARQ-RTT-TimerDL*, and *drx-HARQ-RTT-TimerUL*.  - *drx-onDurationTimer,* *drx-InactivityTimer* or *lpwus\_PDCCHMonitoringTimer* configured for the DRX group is running; or  **Comment 1:** there is no conclusion whether LP-WUS can be configured with secondary DRX or not, so it is unclear whether the lpwus\_PDCCHMonitoringTimer can be “**for the DRX group**” or common to the DRX groups. A Editor’s Note or “[*lpwus\_PDCCHMonitoringTimer*]” can be added. Same issue exists for many places.  **[LGE]** Agree with HW.  **Comment 2:** The “lpwus\_PDCCHMonitoringTimer” needs to be added in the first paragraph above, but FFS whether it is for each DRX group or common to the DRX groups. “lpwus\_PDCCHMonitoringTimer” also needs to be added in “RRC controls DRX operation by configuring the following parameters:” part.  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 grants/assignments/DRX Command MAC CE/Long DRX Command MAC CE received and Scheduling Request sent until 4 ms prior to start of the last LP-WUS occasion, or during a measurement gap, or when the MAC entity monitors for a PDCCH transmission on the search space indicated by *recoverySearchSpaceId* of the SpCell identified by the C-RNTI while the *ra-ResponseWindow* is running (as specified in clause 5.1.4):  5> start *drx-onDurationTimer* after *drx-SlotOffset* from the beginning of the subframe.  **Comment 3:** a new parameter and name for “drx-SlotOffset” is needed for LP-WUS option 1-1 to distinguish it from DCP, it is provided in LP-WUS configuration. And this new parameter needs to be added in “RRC controls DRX operation by configuring the following parameters:” part.  **[LGE]** No need to distinguish drx-SlotOffset between LP-WUS and DCP. In our understanding, if drx-onDurationTimer is started based on LP-WUS indication, the legacy mechanism is applied.  Agreement: In option 1-2, a new timer triggered by LPWUS is introduced. When this new timer is running, UE is in C-DRX active time. When UE is not in C-DRX active time, UE goes back to LPWUS monitoring.  **Comment 4:** For above agreement, currently we can only know that new timer impacts active time and PDCCH monitoring. But “ When UE is not in C-DRX active time, UE goes back to LPWUS monitoring” is not reflected in the spec. There is no any description for the UE behaviour of LP-WUS monitoring. |  |
| InterDigital | **Comment:** It is not meaningful to write the conditions for Long DRX cycle again for LP-WUS option 1-1 while they’re already available in the specification. Option 1-2 can be separated as it is not dependent on the DRX cycle.  One can just use “else if” condition after the DCP conditions for LP-WUS option 1-1. Option 1-2 can be separated as currently implemented since it does not depend on the DRX cycle.  Ie., for example:  1> if the Long DRX cycle is used for a DRX group and the *drx-NonIntegerLongCycleStartOffset* is not configured, and [(SFN × 10) + subframe number] modulo (*drx-LongCycle*) = *drx-StartOffset*; or  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:  (…)  2> else if *lpwus\_PDCCHMonitoringTimer* is not configured:  3> if LP-WUS monitoring is configured:  4> if LP-WUS indication associated with the current DRX cycle received from lower layer indicated to start *drx-onDurationTimer*, as specified in TS 38.213 [6]; or  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 grants/assignments/DRX Command MAC CE/Long DRX Command MAC CE received and Scheduling Request sent until 4 ms prior to start of the last LP-WUS occasion, or during a measurement gap, or when the MAC entity monitors for a PDCCH transmission on the search space indicated by *recoverySearchSpaceId* of the SpCell identified by the C-RNTI while the *ra-ResponseWindow* is running (as specified in clause 5.1.4):  5> start *drx-onDurationTimer* after *drx-SlotOffset* from the beginning of the subframe.  3> else:  4> start *drx-onDurationTimer* for this DRX group after *drx-SlotOffset* from the beginning of the subframe.  **[Sharp 001]:** Agree with comments from InterDigital. Regarding the wording, we prefer to swap 2> and 3>:  2> else if LP-WUS monitoring is configured:  3> if *lpwus\_PDCCHMonitoringTimer* is not configured:  Xxxxxx;  2> else:  3> start drx-onDurationTimer for this DRX group after drx-SlotOffset from the beginning of the subframe. |  |
| Sharp 002 | 1. if LP-WUS monitoring is configured and no DRX group is in Active Time:   **Comment:** For R16 DCP, no monitoring DCP during Active time is specified in RAN1 spec, then for LP-WUS the similar thing can be captured in RAN1 spec and the highlighted part seems unnecessary in RAN2 spec. |  |
| Sharp 003 | 1> if DCP monitoring is configured for the active DL BWP as specified in TS 38.213 [6], clause 10.3, or if LP-WUS monitoring is configured as specified in TS 38.213 [6], clause 10.X; and  ……  3> if *ps-TransmitPeriodicL1-RSRP* or *lpwus-TransmitPeriodicL1-RSRP* is not configured with value *true*:  4> not report periodic CSI that is L1-RSRP on PUCCH.  **Comment:** As per ASN.1 we understand “*ps-TransmitPeriodicL1-RSRP* is not configured with value *true*” means *ps-TransmitPeriodicL1-RSRP* is absent. Then based on 1> and 3>, if LP-WUS monitoring is configured, *lpwus-TransmitPeriodicL1-RSRP* is set to *true*, UE should report periodic CSI, however DCP monitoring is not configured, *ps-TransmitPeriodicL1-RSRP* must be absent, then the UE cannot report periodic CSI. It could be changed as below:  3> if DCP monitoring is configured and *ps-TransmitPeriodicL1-RSRP* is not configured with value true, or  3> if LP-WUS monitoring is configured and *lpwus-TransmitPeriodicL1-RSRP* is not configured with value true:  The same comment on *ps-TransmitOtherPeriodicCSI* and *lpwus-TransmitOtherPeriodicCSI*. |  |
| Lenovo | - lpwus\_PDCCHMonitoringTimer (Optional): the duration after the LP-WUS occasion in which a LP-WUS indicates the UE's PDCCH monitoring activity for the MAC entity.  Comment: RAN2 has not agreed on a name yet. The term [new timer] has been used in other specs so we think that can be used here as well until further agreements in RAN2. |  |
| LGE 001 | 1> if LP-WUS monitoring is configured and no DRX group is in Active Time:  …  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 grants/assignments/DRX Command MAC CE/Long DRX Command MAC CE received and Scheduling Request sent until 4 ms prior to start of the last LP-WUS occasion, or during a measurement gap, or when the MAC entity monitors for a PDCCH transmission on the search space indicated by *recoverySearchSpaceId* of the SpCell identified by the C-RNTI while the *ra-ResponseWindow* is running (as specified in clause 5.1.4):  **Comment:** Yellow parts above contradict each other. In RAN1#120, RAN1 agreed "For RRC connected mode, UE does not monitor LP-WUS during C-DRX active time.", so we believe that no monitoring of LP-WUS in Active time is captured in RAN1 specification, similar to DCP. Thus, "no DRX group is in Active Time" can be removed in RAN2 specification. |  |
| LGE 002 | 1> if the Long DRX cycle is used for a DRX group and the *drx-NonIntegerLongCycleStartOffset* is not configured, and [(SFN × 10) + subframe number] modulo (*drx-LongCycle*) = *drx-StartOffset*; or  …  2> if DCP monitoring is configured for the active DL BWP as specified in TS 38.213 [6], clause 10.3:  …  2> else if *lpwus\_PDCCHMonitoringTimer* is not configured:  3> start *drx-onDurationTimer* for this DRX group after *drx-SlotOffset* from the beginning of the subframe.  1> if LP-WUS monitoring is configured and no DRX group is in Active Time:  …  **Comment:** For Option 1-1, drx-onDurationTimer is started based on LP-WUS indication.  However, according to the above yellow part, drx-onDurationTimer is started in Option 1-1 regardless of LP-WUS indication, and we think this is not correct.  One suggestion is to move "else" part after the end of LP-WUS condition and to move LP-WUS condition under Long DRX cycle condition, i.e.,  1> if the Long DRX cycle is used for a DRX group and the *drx-NonIntegerLongCycleStartOffset* is not configured, and [(SFN × 10) + subframe number] modulo (*drx-LongCycle*) = *drx-StartOffset*; or  …  2> if DCP monitoring is configured for the active DL BWP as specified in TS 38.213 [6], clause 10.3:  …  2> else if LP-WUS monitoring is configured:  …  2> else:  3> start *drx-onDurationTimer* for this DRX group after *drx-SlotOffset* from the beginning of the subframe.  Based on LGE 01 and LGE 02, we provide "DraftCR \_Running MAC CR for LP-WUS\_v2\_LGE.docx" |  |
| Qualcomm-1 | The following definition is unclear, does it mean the time offset between LP-WUS occasion and the start of PDCCH monitoring, or the onduration time during which UE should monitor PDCCH? If it is later, prefer to refine the definition  *lpwus\_PDCCHMonitoringTimer* (Optional): the duration after the LP-WUS occasion in which a LP-WUS indicates the UE's PDCCH monitoring activity for the MAC entity. |  |
| Qualcomm-2 | The following bullet is under the condition of legacy DRX configuration, no need to add.  2> else if *lpwus\_PDCCHMonitoringTimer* is not configured:  3> start *drx-onDurationTimer* for this DRX group after *drx-SlotOffset* from the beginning of the subframe. |  |
| CATT | 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:  3> if DCP indication associated with the current DRX cycle received from lower layer indicated to start *drx-onDurationTimer*, as specified in TS 38.213 [6]; or  3> if all DCP occasion(s) in time domain, as specified in TS 38.213 [6], associated with the current DRX cycle occurred in Active Time considering grants/assignments/DRX Command MAC CE/Long DRX Command MAC CE received and Scheduling Request sent until 4 ms prior to start of the last DCP occasion, or during a measurement gap, or when the MAC entity monitors for a PDCCH transmission on the search space indicated by *recoverySearchSpaceId* of the SpCell identified by the C-RNTI while the *ra-ResponseWindow* is running (as specified in clause 5.1.4); or  3> if *ps-Wakeup* is configured with value *true* and DCP indication associated with the current DRX cycle has not been received from lower layers:  4> start *drx-onDurationTimer* after *drx-SlotOffset* from the beginning of the subframe.  2> else if *lpwus\_PDCCHMonitoringTimer* is not configured:  3> start *drx-onDurationTimer* for this DRX group after *drx-SlotOffset* from the beginning of the subframe.  **[Comments]**   1. if DCP monitoring is configured for the active DL BWP as specified in TS 38.213 [6], clause 10.3:   /…/  2> else if *lpwus\_PDCCHMonitoringTimer* is not configured  The above branch highlighted in yellow includes the following cases:  Case 1: DCP is not configured and both LP-WUS option 1-1 and Option 1-2 are not configured.  Case 2: DCP and LP-WUS option 1-2 are not configured but LP-WUS option 1-1 configured;  In our understanding, the UE needs to check LP-WUS for Case 2. And the UE behaviour has been specified below. Hence, we suggest change the part as below:  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:  3> if DCP indication associated with the current DRX cycle received from lower layer indicated to start *drx-onDurationTimer*, as specified in TS 38.213 [6]; or  3> if all DCP occasion(s) in time domain, as specified in TS 38.213 [6], associated with the current DRX cycle occurred in Active Time considering grants/assignments/DRX Command MAC CE/Long DRX Command MAC CE received and Scheduling Request sent until 4 ms prior to start of the last DCP occasion, or during a measurement gap, or when the MAC entity monitors for a PDCCH transmission on the search space indicated by *recoverySearchSpaceId* of the SpCell identified by the C-RNTI while the *ra-ResponseWindow* is running (as specified in clause 5.1.4); or  3> if *ps-Wakeup* is configured with value *true* and DCP indication associated with the current DRX cycle has not been received from lower layers:  4> start *drx-onDurationTimer* after *drx-SlotOffset* from the beginning of the subframe.  2> else if LP-WUS monitoringis not configured:  3> start *drx-onDurationTimer* for this DRX group after *drx-SlotOffset* from the beginning of the subframe. |  |
| ZTE | **Comment 1:**  For the name of lpwus\_PDCCHMonitoringTimer, we have similar comments as NEC, the usage of the new timer is same as the *drx-onDurationTimer, except ddifferent value may be configured for*  *drx-onDurationTimer* and the new timer. So, we prefer to use the name *drx-onDurationTimer-LPWUS****.***  **Comment 2:** the following branch covers both option 1-1 and option 1-2  2> else if *lpwus\_PDCCHMonitoringTimer* is not configured:  3> start *drx-onDurationTimer* for this DRX group after *drx-SlotOffset* from the beginning of the subframe.  It should be:  2> else if LP-WUS monitoringis not configured:  3> start *drx-onDurationTimer* for this DRX group after *drx-SlotOffset* from the beginning of the subframe. |  |
| vivo | For the start time of  *lpwus\_PDCCHMonitoringTimer:*  >start *lpwus\_PDCCHMonitoringTimer* from the beginning of the subframe indicated from lower layer  We could add an EN that FFS the detail time when to start *lpwus\_PDCCHMonitoringTimer.*  Since according to the RAN1 agreement as below, it seems an time offset4 between LP-WUS indicition reception and the timer start will be configured:  **Agreement**  For LP-WUS MOs in connected mode for Option 1-2, support Approach 1:   * LP-WUS MOs, including periodicity and time offset3, are configured independently from the C-DRX periodicity/offset by new RRC parameter(s).   + FFS one or multiple MOs per periodicity * UE monitors LP-WUS in the LP-WUS MOs and, if triggered to wake up, starts a new timer for PDCCH monitoring triggered by LP-WUS, after a time offset4.   + The time offset4 configured by the network indicating a time, after which the UE starts PDCCH monitoring via starting the new timer.   + FFS: Definition of time offset4 |  |
| vivo | Regarding the comments on LGE 002, we donot agree it by now, as we have no conclusion on whether LP-WUS option 1-2 is applicable for long DRX only or not. But the suggested text means that option 1-2 is only applicable for long DRX cycle.  Thus, we could wait for further comments. Maybe an EN could be added. |  |

# 3 Conclusion

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