**3GPP TSG RAN WG1 Meeting #101-e R1-** **200xxxx**

**e-Meeting, 25th May – 5th June 2020**

**Title: Summary of PDCCH based Power Saving Signal/Channel**

**Agenda item: 7.2.7.1**

**Source: CATT**

**Document for: Discussion**

**Email Discussions**

**Preparation**

* Issue 1: Confirm Working Assumption of minimum time gap values (section 3.1)
* Issue 2: RAR is prioritize over DCP during RAR monitoring window (section 3.2)
* Issue 3: Specification alignment and text proposals (Section 3.3)
* Issue 4: DCI size budget for DCI format 2\_6 (Section 3.4)

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| --- | --- | --- |
| **Company** | **Supporting Issues** | **Comments** |
| Samsung | Issue 1: OK to discuss. Support confirming WA  Issue 2: OK to discuss. Do not support the proposal from FL.  Issue 3: OK to discuss. | Issue 4: No need to discuss. No need for any proposal. The arguments in Section 3.4 are incorrect due to the following:   * There is no ambiguity on how to account for the total budget of DCI format sizes. UE determines the DCI format size budget based on the search space sets the UE is configured to monitor PDCCH, as described in TS 38.213. * TS 38.213 states that “*The UE does not monitor PDCCH for detecting DCI format 2\_6 during Active Time [11, TS 38.321]*”. So, no need for proposal in counting DCI format 2\_6 outside Active Time sepeartely. * “NOT be counted” has no meaning for a UE implementation. We cannot say that DCI format 2\_6 is an invisible DCI format for the UE with respect to the number of DCI format sizes the UE has to monitor. |
| ZTE | Issue 1,2,3,4 | We are okay to discuss issue 1,2,3,4 in this meeting.  Noted that for issue 2, the discussion is triggered by the LS in AI 5, and we are okay to discuss it in AI 5 or AI 7.2.7.1.  In section 3.2, our view is added. |
| Ericsson | Issues 1,2,3,4 |  |
| Intel | Issues 1,2,3,4 | As discussed over email, we believe the combination of RNTIs monitored outside active time can be discussed as part of issue 2. In case issue 2 is discussed in AI 5, we suggest to just add a separate issue in 7.2.7.1 targeting that matter.  **Issue 5: Combinations of RNTIs monitored outside active time** (can be combined with Issue 2 or discussed separately) |
| CMCC | Issues 1,2,3,4 | For issue 2, we also support RAR is prioritize over DCP during RAR monitoring window.  In adddtion, we also want to clarify the DCI format 2\_6 transimmion behaviour in multiple monitoring occasions.   * DCI format 2\_6 should be transmitted in only one monitoring occasion or all monitoring occasions. |
| ASUSTeK | Issue 1,2,3,4 | It’s fine to discuss issue 1,2,3,4.  Though we are open to discuss issue 4, we think the current text may be sufficient (or with some minor clarification, e.g. DCI size budget only applied for the case within Active Time). |
| Nokia | Issues 1,2,3 and 4 are OK for us. | We agree with Intel, that it would good to clarify 38.202. Current text seems to be contradiction with MAC spesification. |
| MediaTek | Issues 1,2,3,4 | We are also fine to discuss the issue mentioned by Intel to clarify the RNTIs combination monitored outside active time in 38.202. |
| Huawei, HiSilicon | We are fine to discuss Issues 1,2,3,4. | 1. We think Issue#2 can be discussed in the LS AI. For the combinations with other RNTIs, we think it should be discussed. But we suggest to focus on the case of collision between DCP and RAR addressed to C-RNTI, which is raised in RAN2 LS. For issues newly raised during the preparation phase, it is better to note them this time and give companies time until the next meeting to look into the issue properly. 2. A number of companies raised the issue to clarify the BWP switching timing considering the DCI format 2\_6 triggered dormancy adaptation is different from the BWP switching triggered by scheduling DCI. The same BWP switching due to dormancy adaptation would be transmitted in the DCI format 2\_6 which may be transmitted on any one of the multiple occasions. There is no HARQ-ACK transmission for the DCI format 2\_6, and therefore the UE and gNB may have different understanding regarding the timing of BWP switching, which means different understanding regarding the interruption time etc. We propose to clearly define/clarify the timing of BWP switching triggered by the DCI format 2\_6.   **Issue#5: clarify/define the start of the BWP swiching triggered by DCI format 2\_6.** |
| OPPO | Issues 1,2,3,4 | Fine to discuss these issue.  For issue 1, we shall discuss how to UE and gNB align BWP switching.  For issue 3, we can discuss this issue in RAN 1 but it would be better make the change in RAN2. |

Summary from contributions reviews

## Minimum time gap – values

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **RAN1#99 agreements**  Agreements:s  The minimum time gap between the end of the slot of last DCI format 3\_0 monitoring occasion and the start of the DRX ON is a UE capability based on subcarrier spacing.   * The reporting is per SCS in units of slots of the respective SCS   + The reported value for a SCS is taken from two possible values per SCS   + The largest value of minimum time gap in UE capability is no more than the number of slots equal to [3]ms * FFS impact of dormancy/non-dormancy transition   **RAN1#100-e agreements**  **Agreements**  PS\_offset range from {0.125ms to 15 ms} for all SCS.  **Agreements**  The PS\_offset resolution is 0.125 ms.  **Agreements**  **Candidate values for the minimum time gap are specified by RAN1 and shared with RAN4**  ·       **Minimum time gap is no more than 3 ms for all SCSs**  ·       **Two values of minimum time gap for each SCS are proposed as**   * SCS 15kHz: {TBD, TBD} slots * SCS 30kHz {TBD,  TBD} slots * SCS 60kHz {TBD, TBD} slots * SCS 120kHz {TBD, TBD} slots   **RAN1#100bis-e agreements**  Proposal 1:   * The value of minimum time gap is decoupled with SCell dormancy indication. * Working assumption: Two values of minimum time gap in terms of slots per SCS are specified based on the assumption that PDCCH carrying DCI format 2\_6 can be at any symbol of the slot indicated by *monitoringSymbolsWithinSlot* of SearchSpace IE as follows,      |  |  |  | | --- | --- | --- | | SCS (kHz) | Minimum Time Gap TminimumTimeGap(slots) | | | Value 1 | Value 2 | | 15 | 1 | 3 | | 30 | 1 | 6 | | 60 | 1 | 12 | | 120 | 2 | 24 | |

During RAN1#100bis-e email discussion, working assumption was made to have the value of minimum time gap is decoupled with SCell dormancy indication and two values of minimum time gap.

Proposals from companies

* Confirmation of working assumptions – CATT, MediaTek, Samsung, CMCC, OPPO, Ericsson, Nokia
* New values – Huawei, Qualcomm, DoCoMo
  + Huawei

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | NR Slot length (ms) | Capability Type 1 | | Capability Type 2 |
| UE not report pdcch-MonitoringAnyOccasions | UE reports pdcch-MonitoringAnyOccasions |
| 0 | 1 | 0 | 1 | 1 |
| 1 | 0.5 | 0 | 1 | 2 |
| 2 | 0.25 | 1 | | 4 |
| 3 | 0.125 | 2 | | 8 |

* + Qualcomm
    - SCS 15kHz: {1, 3} slots
    - SCS 30kHz: {2, 6} slots
    - SCS 60kHz: {3, 12} slots
    - SCS 120kHz: {6, 24} slots
  + DoCoMo

|  |  |  |
| --- | --- | --- |
| SCS (kHz) | Minimum Time Gap TminimumTimeGap(slots) | |
| Value 1 | Value 2 |
| 15 | 1 | 3 |
| 30 | 1 | 5 |
| 60 | 1 | 9 |
| 120 | 2 | 18 |

**Proposal: Confirm the working assumptions**

* The value of minimum time gap is decoupled with SCell dormancy indication.
* Working assumption: Two values of minimum time gap in terms of slots per SCS are specified based on the assumption that PDCCH carrying DCI format 2\_6 can be at any symbol of the slot indicated by *monitoringSymbolsWithinSlot* of SearchSpace IE as follows,

|  |  |  |
| --- | --- | --- |
| SCS (kHz) | Minimum Time Gap TminimumTimeGap (slots) | |
| Value 1 | Value 2 |
| 15 | 1 | 3 |
| 30 | 1 | 6 |
| 60 | 1 | 12 |
| 120 | 2 | 24 |

## Collisoin of DCP and RAR

RAN2 LS in [18] would like to ask RAN1 how to resolve the collision between the DCP and the RAR addressed to C-RNTI with different quasi-collocated property during BFR.

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| **1. Collision between DCP and RAR addressed to C-RNTI**  RAN2 has discussed UE behavior when a DCP monitoring occasion overlaps with the *ra-ResponseWindow* or *msgB-ResponseWindow*. RAN2 understanding is that according to current TS 38.213 prioritization rules, if DCP collides with RAR addressed to C-RNTI (e.g. during BFR) and the search spaces are not quasi-collocated, DCP will be prioritized as it is type-3 CSS and thus impacting legacy RAR behavior.  RAN2 would like to ask RAN1 the following:   * To confirm RAN2 understanding that if DCP and RAR search spaces are not quasi-collocated, a collision between DCP and RAR addressed to C-RNTI will impact legacy RAR handling.   + From RAN2 point of view, the understanding is that RAR addressed all RNTIs should be prioritized over DCP by the UE. * RAN2 would like to ask if RAN1 has any concerns with the understanding above? If RAN1 doesn’t have any concerns, what is RAN1 preference on where to capture this behavior e.g. TS 38.213 or in TS 38.321 via a DCP monitoring exception rule similar to overlap with DRX Active time? |

The collision of DCP and RAR monitoring were discussed with proposals as follows,

* RAR is prioritized over DCP –
  + gNB implementation with current specification - vivo, Huawei, Samsung
  + RAR with CRC scrambled by C-RNTI over DCP – CATT, Intel, LG, Ericsson, Nokia,ZTE,CMCC

**Proposal:**

**RAR is prioritize over DCP during RAR monitoring window. Discuss further**

* **RAN2 LS reply**
* **Any RAN1 specification change**

## Spcification Alignment - Clarification the interaction between PHY and MAC layers

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| --- |
| **RAN1#100bis-e agreements**  **Proposal 1:**  L1 procedure of DCI format 2\_6 detection   * Successful decoding of DCI format 2\_6   + L1 sends a positive indication to MAC when the value of wakeup indication bit is “1”   + L1 sends a negative indication to MAC when the value of wakeup indication bit is “0” * Miss-detection - all CRC checks fails on DCI format 2\_6   + L1 does not send any indication to MAC * All invalid monitoring occasions – following legacy behavior to wakeup   + L1 sends a positive indication to MAC    TP was approved and captured in [19] |

The proposed TP was agreed to capture the general behavior. However, the editor of 38.213 deos not capture the TP exactly as those were agreed in [19]. There were discussions (ZTE, CATT, AsusTek, Spreadtrum) to clarify the exact text of the decoding bit value ‘1’ and ‘0’ from DCI format 2\_6 associated with Wake-up and no-Wake-up indication. In addition, RRC parameters *ps-PositionDCI-2-6 and sizeDCI-2-6*are updated.

**Proposal:**

**TP to capture value ‘1’ and ‘0’ from DCI format 2\_6 associated with Wake-up and no-Wake-up indication**

-----------------------------------------------------Start of TP of 38.213----------------------------------------------------------

***10.3 PDCCH monitoring indication and dormancy/non-dormancy behaviour for SCells***

A UE configured with DRX mode operation [11, TS 38.321] can be provided the following for detection of a DCI format 2\_6 in a PDCCH reception on the PCell or on the SpCell [12, TS 38.331]

- a PS-RNTI for DCI format 2\_6 by *ps-RNTI*

- a number of search space sets, by *dci-Format2-6*, to monitor PDCCH for detection of DCI format 2\_6 on the active DL BWP of the PCell or of the SpCell according to a common search space as described in Clause 10.1

- a payload size for DCI format 2\_6 by *~~SizeDCI\_2-6~~ sizeDCI\_2-6*

- a location in DCI format 2\_6 of a Wake-up indication bit by *~~PSPositionDCI2-6~~* *ps-PositionDCI-2-6*, ~~where~~

~~- the UE may not start the~~ *~~drx-onDurationTimer~~* ~~for the next long DRX cycle when a value of the Wake-up indication bit is '0', and~~

* a value ‘0’ of Wake-up indication bit is the no-Wake-up indication
* a value ‘1’ of Wake-up indication bit is the Wake-up indication
* ~~the UE starts the~~ *~~drx-onDurationTimer~~* ~~for the next long DRX cycle when a value of the Wake-up indication bit is~~ '1'

-----------------------------------------------------End of TP of 38.213---------------------------------------------------------------

RAN2 also reach agreements on the update parameters name in [18]

**Agreements**

1 RAN2 confirms that the flags ps-TransmitPeriodicL1-RSRP and ps-TransmitPeriodicCSI are defined per cell group

2 The flags ps-TransmitPeriodicCSI and ps-TransmitPeriodicL1-RSRP are independent, and it is possible to control UE to report all types of periodic CSI apart from L1-RSRP (i.e. cri-RSRP and ssb-Index-RSRP)

3 The flag ps-TransmitPeriodicCSI is renamed to ps-TransmitOtherPeriodicCSI

**TP for Clause 5.1.6.1 and 5.2.2.5 of TS 38.214.**

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| **5.1.6.1 CSI-RS reception procedure**  <omitted text>  If the UE is configured with DRX,  - if the UE is configured to monitor DCI format 2\_6 and configured by higher layer parameter *ps-TransmitOtherPeriodicCSI* *~~ps-TransmitPeriodicCSI~~* to report CSI with the higher layer parameter *reportConfigType* set to ‘periodic’ and *reportQuantity* set to quantities other than ‘cri-RSRP’ and ‘ssb-Index-RSRP’ when *drx-onDurationTimer* is not started, the most recent CSI measurement occasion occurs in DRX active time or during the time duration indicated by *drx-onDurationTimer* also outside DRX active time for CSI to be reported;  - if the UE is configured to monitor DCI format 2\_6 and configured by higher layer parameter *ps-TransmitPeriodicL1-RSRP* to report L1-RSRP with the higher layer parameter *reportConfigType* set to ‘periodic’ and *reportQuantity* set to cri-RSRP when *drx-onDurationTimer* is not started, the most recent CSI measurement occasion occurs in DRX active time or during the time duration indicated by *drx-onDurationTimer* also outside DRX active time for CSI to be reported;  - otherwise, the most recent CSI measurement occasion occurs in DRX active time for CSI to be reported.  <omitted text> |
| **5.2.2.5 CSI reference resource definition**  <omitted text>  When DRX is configured, the UE reports a CSI report only if receiving at least one CSI-RS transmission occasion for channel measurement and CSI-RS and/or CSI-IM occasion for interference measurement in DRX Active Time no later than CSI reference resource and drops the report otherwise. When the UE is configured to monitor DCI format 2\_6 and if the UE configured by higher layer parameter *ps-TransmitOtherPeriodicCSI* *~~ps-TransmitPeriodicCSI~~* to report CSI with the higher layer parameter *reportConfigType* set to ‘periodic’ and *reportQuantity* set to quantities other than ‘cri-RSRP’ and ‘ssb-Index-RSRP’ when *drx-onDurationTimer* is not started, the UE shall report CSI during the time duration indicated by *drx-onDurationTimer* also outside active time according to the procedure described in Clause 5.2.1.4 if receiving at least one CSI-RS transmission occasion for channel measurement and CSI-RS and/or CSI-IM occasion for interference measurement during the time duration indicated by drx-onDurationTimer outside DRX active time or in DRX Active Time no later than CSI reference resource and drops the report otherwise. When the UE is configured to monitor DCI format 2\_6 and if the UE configured by higher layer parameter *ps-TransmitPeriodicL1-RSRP* to report L1-RSRP with the higher layer parameter *reportConfigType* set to ‘periodic’ and *reportQuantity* set to ‘cri-RSRP’ or ‘ssb-Index-RSRP’ when *drx-onDurationTimer* is not started, the UE shall report L1-RSRP during the time duration indicated by *drx-onDurationTimer* also outside active time according to the procedure described in clause 5.2.1.4 and when reportQuantity set to ‘cri-RSRP’ if receiving at least one CSI-RS transmission occasion for channel measurement and CSI-RS and/or CSI-IM occasion for interference measurement during the time duration indicated by drx-onDurationTimer outside DRX active time or in DRX Active Time no later than CSI reference resource and drops the report otherwise.  <omitted text> |

## DCI size budget for DCI format 2\_6

Currently the DCI format size budget per UE is determined without separation for the capability between CONNECTED or IDLE/INACTIVE, nor between outside active time and inside active time. The only separation is done via defining the RNTIs for UE monitoring. There are RNTIs (C-RNTI, P-RNTI, SI-RNTI, RA-RNTI) that UE may need to monitor outside active time which the corresponding DCI formats are accounted in DCI-format size budget. The intent of the DCI format 2\_6 outside active time use would NOT be counted in the total budget of DCI format sizes. Several companies (vivo, CATT, MediaTek, Ericsson, Qualcomm) have proposals in counting DCI format 2\_6 outside Active Time sepeartely and how to account for the total budget of DCI format sizes.

Proposal: DCI format 2-6 size is aligned to the DCI size budget outside Active Time.

## Others

* The starting time of BWP switching after dormancy indication received from DCI format 2\_6 –
  + Inconsistent power saving information (vivo) – no-Wakeup and non-dormant SCell indications for a UE
  + More than one DCI format 2\_6 are received (vivo, Huawei) –
  + No DCI format 2\_6 monitoring during BWP switching
* Valid moniotoring occasion when more than one avalailable moniotoring occasions in a search space set (LG)
* No restriction on minimum time gap without UE capability feedback (Qualcomm)

# Contributions summary and proposals

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| vivo[1] | * Proposal 1: PDCCH monitoring for RAR dropping due to different QCL properties can be avoided by proper network implementation. No additional UE behavior need to be specified.   + Send LS to RAN2 to inform above decisions. * Proposal 2: UE is not expected to be indicated by PDCCH WUS not to wake up while SCell group is indicated to non-dormancy state. Capture TP in Appendix 1 in [R1-2003403](file:///E:\My%20Documents\3gpp\wg1-101%20e-meeting\R1-2003403.zip) for TS38.213. * Proposal 3: The starting point of BWP switching of Scell dormancy should be defined from the following alternatives,   + Alt 1: the starting of BWP switching of Scell dormancy is after the last valid monitoring occasion for DCI format 2-6   + Alt 2: the starting of BWP switching time of Scell dormancy is n slot prior to DRX ON, where n is the Scell dormancy/non-dormancy switching time. * Proposal 4: The size of DCI format 2-6 is not restricted by the existing DCI size budget (3+1) in Rel-15 which is used in Active Time. Capture TP in Appendix 2 in R1-2003043 for TS38.212. |
| ZTE [2] | * Proposal 1: The following TP of L1 procedure of the detection of DCI format 2\_6 is proposed (wakeup bit). * Proposal 2: Adopt the following TP for Clause 5.1.6.1 and 5.2.2.5 of TS 38.214. (*ps-TransmitOtherPeriodicCSI)* |
| Huawei, HiSilicon [3] | * Proposal 1: Confirm the working assumption made in RAN1#100b-e that the value of minimum time gap is decoupled with SCell dormancy indication. * Proposal 2: The values of minimum time gap during which the detection of DCI format 2\_6 is not required prior to the start of ON Duration Timer are determined per SCS according to the reported capability type of UE as the following table.  |  |  |  |  |  | | --- | --- | --- | --- | --- | |  | NR Slot length (ms) | Capability Type 1 | | Capability Type 2 | | UE not report pdcch-MonitoringAnyOccasions | UE reports pdcch-MonitoringAnyOccasions | | 0 | 1 | 0 | 1 | 1 | | 1 | 0.5 | 0 | 1 | 2 | | 2 | 0.25 | 1 | | 4 | | 3 | 0.125 | 2 | | 8 |  * Proposal 3: Further discuss and narrow down between Alt.1, Alt.2 and Alt. 3 for UE behaviour when dormancy indication is configured. * Proposal 4: Adopt TP1 in TS 38.214 to clarify UE behaviour of RRM measurement when DCI format 2\_6 is configured. |
| CATT [4] | * Proposal 1: The working assumption is confirmed. Two values of minimum time gap in terms of slots per SCS are specified based on the assumption that PDCCH carrying DCI format 2\_6 can be at any symbol of the slot indicated by monitoringSymbolsWithinSlot of SearchSpace IE as follows,      |  |  |  | | --- | --- | --- | | SCS (kHz) | Minimum Time Gap TminimumTimeGap(slots) | | | Value 1 | Value 2 | | 15 | 1 | 3 | | 30 | 1 | 6 | | 60 | 1 | 12 | | 120 | 2 | 24 |  * Proposal 2: RAR indicated by PDCCH with CRC scrambled by C-RNTI or MCS-C-RNTI should be prioritized over DCP by the UE outside Active Time, especially when they have different QCL-TypeD properties. * Proposal 3: The detected value of the Wake-up indication bit from DCI format 2\_6 needs to be defined clearly to have ‘1’ associated with Wake-up indication and ‘0’ associated with no-Wake-up indication. * Proposal 4: DCI format 2\_6 is not counted in the DCI size alignment. |
| MediaTek[5] | * Proposal 1: Confirm the working assumption for minimum time gap in RAN1 #100b.   + The value of minimum time gap is decoupled with SCell dormancy indication.   + Two values of minimum time gap in terms of slots per SCS are specified based on the assumption that PDCCH carrying DCI format 2\_6 can be at any symbol of the slot indicated by *monitoringSymbolsWithinSlot* of SearchSpace IE as follows,  |  |  |  | | --- | --- | --- | | SCS (kHz) | Minimum Time Gap TminimumTimeGap(slots) | | | Value 1 | Value 2 | | 15 | 1 | 3 | | 30 | 1 | 6 | | 60 | 1 | 12 | | 120 | 2 | 24 |  * Proposal 2: DCI format 2\_6 is not counted in the DCI size budget. * Proposal 3: Adopt the TP in TS 38.213 as follows (prior to). |
| Intel [6] | * Proposal 1: If the DCI format 2\_6 monitoring occasion overlaps with ra-ResponseWindow or msgB-ResponseWindow, the UE does not monitor for DCI format 2\_6. * Proposal 2: Adopt the following TP |
| Samsung [7] | * Proposal #1: Confirm the working assumption for the values of the minimum time gap * Observation #1: The specifications with respect to the size of DCI format 2\_6 are complete. The Rel-15 DCI format size budget is not exceeded. The size of DCI format 2\_6 should be counted towards the maximum number of DCI format sizes as for every other DCI format. * Observation #2: There is no need for any specification impact with respect to monitor ‘RAR’ scheduled by a DCI format with a C-RNTI or an MCS-C-RNTI. |
| NEC [8] | * Using the unified wording “PCell or PSCell” is also recommended instead of “PCell or SpCell”. |
| CMCC [9] | * Proposal 1. Support to confirm the working assumption   + The value of minimum time gap is decoupled with SCell dormancy indication.   + Two values of minimum time gap in terms of slots per SCS are specified based on the assumption that PDCCH carrying DCI format 2\_6 can be at any symbol of the slot indicated by *monitoringSymbolsWithinSlot* of SearchSpace IE as follows,  |  |  |  | | --- | --- | --- | | SCS (kHz) | Minimum Time Gap TminimumTimeGap(slots) | | | Value 1 | Value 2 | | 15 | 1 | 3 | | 30 | 1 | 6 | | 60 | 1 | 12 | | 120 | 2 | 24 |  * Proposal 2. DCI format 2\_6 should be transmitted in only one monitoring occasion or all monitoring occasions. |
| Spreadstrum[10] | * Proposal 1: For P-CSI/L1-RSRP measurement/report, consider to adopt TP in Appendix 5.1. * Proposal 2: To clarify the real starting of monitoring is the beginning of the 1st full “duration”, consider to adopt TP in Appendix 5.2. * Proposal 3: To align parameters in RAN2, such as ps-Wakeup, ps-PositionDCI-2-6 and sizeDCI-2-6, consider to adopt TP in Appendix 5.2 and 5.3. |
| LG [11] | * Proposal 1: At least for CFRA, the SS set related to BFR procedure has a higher priority than SS set to be monitored for DCI format 2\_6. * Proposal 2: The monitoring occasion which has at least one actually monitored candidate is regarded as a valid monitoring occasion. * Proposal 3: A UE monitors DCI format 2\_6 in the first available full duration within a monitoring window. |
| OPPO [12] | * Proposal 1: Confirm the working assumption.   + The value of minimum time gap is decoupled with SCell dormancy indication.   + Two values of minimum time gap in terms of slots per SCS are specified based on the assumption that PDCCH carrying DCI format 2\_6 can be at any symbol of the slot indicated by monitoringSymbolsWithinSlot of SearchSpace IE as follows,  |  |  |  | | --- | --- | --- | | ***SCS (kHz)*** | ***Minimum Time Gap TminimumTimeGap(slots)*** | | | ***Value 1*** | ***Value 2*** | | ***15*** | ***1*** | ***3*** | | ***30*** | ***1*** | ***6*** | | 60 | 1 | 12 | | 120 | 2 | 24 |  * Proposal 2: when the UE is configured scell dormancy operation, the UE doesn’t need to monitor WUS during its BWP switching delay before DRX ON. |
| AsusTek[13] | * Proposal: RAN1 adopts either TP1 or TP2 to avoid discrepancy on interaction between PHY and MAC on wake up indication |
| Ericsson [14] | * Proposal 1 UE is not required to monitor DCI 2-6 in monitoring occasions that overlaps with the ra-ResponseWindow or beam-failure recovery procedure. * Proposal 2 RAN1 to provide the following response to RAN2 LS (R1-2003260)   + RAN1 does not have a concern with the RAN2 understanding and asks RAN2 to capture in 38.321 that the UE wakes up in an upcoming ON duration when a DCI 2-6 monitoring occasion overlaps the ra-ResponseWindow or beam-failure recovery procedure. * Proposal 3 RAN1 to confirm the minimum time gap values in the WA as well as the decoupling of minimum time gap values from Scell dormancy indication. * Proposal 4 DCI sizes in the budget calculation are counted separately for the cases of within Active time and outside Active time. * Proposal 5 Adopt TP1 for 38.212 subclause 7.3.1.0 DCI sizes in the budget calculation are counted separately for the cases of within Active time and outside Active time. |
| NTT DoCoMo [15] | * Proposal 1: Two candidate values of UE reported minimum time gap for each SCS are:  |  |  |  | | --- | --- | --- | | SCS (kHz) | Minimum Time Gap TminimumTimeGap(slots) | | | Value 1 | Value 2 | | 15 | 1 | 3 | | 30 | 1 | 5 | | 60 | 1 | 9 | | 120 | 2 | 18 | |
| Qualcomm[16] | * Proposal 1: For consistency, the lower set of values for the minimum time gap should not be smaller than the Z values (i.e., {1, 1, 2, 2}) for the application delay of the minimum scheduling offset restriction. * Proposal 2: For the reported UE capability on the minimum time gap, the following sets of values can be considered:   + SCS 15kHz: {1, 3} slots   + SCS 30kHz: {2, 6} slots   + SCS 60kHz: {3, 12} slots   + SCS 120kHz: {6, 24} slots * Proposal 3: For the reported UE capability on the minimum time gap, adding a third option of ‘No restriction’ can be considered. The third option can be implicitly signaled by omitting the capability report for the minimum time gap. * Proposal 4: For the aggregation level and the number of PDCCH candidates for DCI format 2\_6, reuse those for DCI format 2\_0. * Proposal 5: Separate sets of DCI format sizes are accounted for within and outside the Active Time. The size of DCI format 2\_6 is counted in the DCI size budget for “outside Active Time”. |
| Nokia, NSB [17] | * Proposal 1: When monitoring occasions of DCI format 2\_6 overlaps with PDCCH monitoring in search space given recoverySearchSpaceId as described in Section 6 of 38.213, UE should follow the legacy DRX operation. * Proposal 2: Send a LS to RAN2 indicating that RAN1 agrees that there could be impact to the legacy RAR monitoring configuration and that the behaviour related to DCP and RAR monitoring could be captured to RAN2 specification. * Proposal 3: Confirm the working assumption take in the RAN1#100bis-e:   working assumption:   * The value of minimum time gap is decoupled with SCell dormancy indication. * Two values of minimum time gap in terms of slots per SCS are specified based on the assumption that PDCCH carrying DCI format 2\_6 can be at any symbol of the slot indicated by *monitoringSymbolsWithinSlot* of SearchSpace IE as follows,      |  |  |  | | --- | --- | --- | | SCS (kHz) | Minimum Time Gap TminimumTimeGap(slots) | | | Value 1 | Value 2 | | 15 | 1 | 3 | | 30 | 1 | 6 | | 60 | 1 | 12 | | 120 | 2 | 24 | |

# Reference

1. R1-2003403 Maintenance of PDCCH-based power saving signal vivo
2. R1-2003486 Remaining issues on WUS PDCCH ZTE
3. R1-2003518 Remaining issues on PDCCH based power saving Huawei, HiSilicon
4. R1-2003630 Remaining issues on the Power Saving Signals/Channels CATT
5. R1-2003664 Remaining issues on PDCCH-based power saving signal MediaTek Inc.
6. R1-2003745 Remaining details of PDCCH-based power saving signal/channel Intel Corporation
7. R1-2003884 Remaining issues for PDCCH-based power saving signal Samsung
8. R1-2003924 TP for further alignment with RAN2 specifications NEC
9. R1-2003957 Remaining issues on power saving signal/channel CMCC
10. R1-2003999 Clarification on power saving signal Spreadtrum Communications
11. R1-2004025 Remaining issues on PDCCH-based power saving signal/channel LG Electronics
12. R1-2004101 Remaining issues for Power saving signal OPPO
13. R1-2004320 Wake up indication for ON duration timer ASUSTeK
14. R1-2004357 Remaining issues for WUS Ericsson
15. R1-2004398 Maintenance for PDCCH-based power saving signal/channel NTT DOCOMO, INC.
16. R1-2004467 Remainign issues in power saving signal/channel Qualcomm Incorporated
17. R1-2004577 On open issues related to DCI format 2\_6 Nokia, Nokia Shanghai Bell
18. R1-2003260 LS on RAN2 DCP Open Issues, RAN2 InterDigital.
19. R1-2003177 TR38.213 CR 0105 Corrections on UE power savings Samsung