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

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

**Title: [101-e-NR-NR\_UE\_Pow\_Sav-WUS-02]**

**Agenda item: 7.2.7.1**

**Source: CATT**

**Document for: Discussion**

# Final Summary and Agreements

The email discussion on Issue 1 of minimum time gap value and Issue 4 DCI size budget for DCI format 2\_6 with the following agreements and conclusions.

Agreements**:**

* Confirm the WA on the minimum time gap values made in RAN1#100b-e

**Conclusion:**

* No consensus on additional specification change in DCI size alignment for DCI format 2\_6.

## Summary of Email Discussions

For Issue 1, most companies support the confirmation of working assumption on the minimum time gap values with a couple of companies with partially support.

**Proposal 1:**

**Confirm the WA on the minimum time gap values**

* **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** |

Most companies support clarification on the DCI format 2\_6 size budget except objection by one company as follows,

* DCI format 2\_6 excluding from DCI size budget (3+1) –
	+ Nokia, Panasonic, CMCC, vivo, Huawei, HiSilicon, MediaTek, OPPO, ZTE, Intel, APPLE, InterDigital, Sony, ITRI, CATT
* DCI size budget (3+1) remains the same but counting differently outside and within Active Time
	+ Qualcomm, Ericsson
* Not change of DCI size budget
	+ Samsung

**Proposal 2:**

**DCI format 2\_6 exclude from DCI size budget in DCI size alignment**

**Proposal 3:**

**TP for TS38.212 excluding DCI format 2\_6 in DCI size alignment**

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| --- |
| -----------------------------------------------------Start of TP of 38.212------------------------------------------------------------------**7.3.1.0 DCI size alignment****\*\*\* Unchanged text is omitted \*\*\***Step 3:- If both of the following conditions are fulfilled the size alignment procedure is complete-    the total number of different DCI sizes configured to monitor, excluding the size of DCI format 2-6, if configured, is no more than 4 for the cell -    the total number of different DCI sizes with C-RNTI configured to monitor is no more than 3 for the cell**\*\*\* Unchanged text is omitted \*\*\***-----------------------------------------------------End of TP of 38.212----------------------------------------------------------------- |

## Feedbacks from Email discussion

[101-e-NR-NR\_UE\_Pow\_Sav-WUS-02] Email discussion/approval regarding:

* Issue 1: Whether to confirm Working Assumption of minimum time gap values (section 3.1)
* Issue 4: DCI size budget for DCI format 2\_6 (Section 3.4)
	+ Clarification of the specification for DCI size alignment for DCI format 2\_6 outside Active Time

by 5/28, with potential TPs by 6/3 – Fangchen (CATT)

Issue 1: Whether to confirm Working Assumption of minimum time gap values (section 3.1)

* 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 |

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| --- | --- | --- |
| **Company** | **Supporting Issue 1** | **Comments** |
| Nokia | Support | As network needs to account this in the configuration of the DCI format 2\_6 (GC-PDCCH) monitoring, it would not be preferable to fragment the UE capabilities any furhter. |
| Panasonic | Support |  |
| CMCC | Support |  |
| Qualcomm | Partially support | For 60kHz in Value 1, we prefer ‘2 slots’. This renders Value 1 equal to the ‘Z’ value (i.e., {1, 1, 2, 2} in TS 38.214, Table 5.3.1-1), which represents the minimum time required for PDCCH processing and reconfiguration of processing elements for subsequent DCI processing. Also, since there are views from some companies that even smaller values, e.g., zero-slot gap, are required, we suggest to consider another option that allows the UE to omit the min time gap capability reporting, which can be implicitly perceived as ‘no restriction’ or ‘zero gap’ at the network.  |
| Vivo | Partially support |  − For Value 2 , all values is larger than the type 2 BWP switching delay. − For Value 1, some values (15kHz) are larger than type 1 BWP switching delay, but some (60kHz, 120kHz) are not.Although we prefer all the values equal to type 1/type 2 BWP switching time, but we can compromise with the table if consistent design for value 1 exists. for example, value 1 euqals to the value for BWP switching type 1. |
| Huawei, HiSilicon | Support | As we discussed in the last meeting, the value Z of {1,1,2,2} is not a valid argument to have a larger minimum time gap value for Value1 in the working assumption. The value Z in cross-slot scheduling is defined from the start of the slot where the change indication is transmitted to the start of the slot where the indicated minK0 takes effect. Differently, the minimum time gap is defined from the end of the last slot where the UE would be required to monitor DCI format 2\_6 to the start of the slot where the ON duration timer would start. Corresponding to the Z value for 60kHz SCS, the corresponding minimum time gap is 1 slot for PDCCH case 1-1. It should be noted that {1, 1, 2, 2} for Z is defined regarding the PDCCH case 1-1. For PDCCH case 1-2 and case2, one more slot willed added. This is actually why we prefer to have different values for PDCCH case 1-1 and PDCCH case 1-2/PDCCH case 2.However, we would be fine to confirm the working assumption as a compromise. |
| MediaTek | Support | We are fine to confirm the working assumption. |
| Samsung | Support |  |
| OPPO | Support |  |
| ZTE | Support | Okay to confirm the working assumption. |
| Ericsson | Support | We prefer to confirm the WA without creating further UE capability signalling. |
| Intel | Support | Although we have some preferences for Value 1 of 60K to be 2 slots and Value 2 of 30K, 60K, 120K to be not exceeding corresponding type 2 BWP switch delay, we are fine to confirm WA as compromise. |
| Apple | Support | We are fine with confirming the working assumption |
| InterDigital | Support |  |
| SONY | Support | While a “value 1” UE has the capability to wake up quickly, operating in a “value 1” mode is likely to consume more power than operating in a “value 2” mode, depending on implementation. Hence, depending on UE state and UE traffic, we think it would be beneficial if the UE could indicate both an MTG capability and a preferred MTG via UE assistance information. In any case, we are OK to confirm the working assumption as it defines the UE capability aspect. |
| ITRI | Support |  |

Issue 4: DCI size budget for DCI format 2\_6 (Section 3.4)

* Clarification of the specification for DCI size alignment for DCI format 2\_6 outside Active Time

|  |  |  |
| --- | --- | --- |
| **Company** | **Supporting Issue 4** | **Comments** |
| Nokia | Support (excluding DCI format 2\_6 from the budget) | As current spesification only consideres the DCI formats monitored in CONNECTED mode, we would not like to split this in two budgets, inside and outside Active Time. We would prefer to simply exclude DCI format 2\_6 monitored outside the Active time from the evaluation of the budget limit.  |
| Panasonic | Support | It should be clarified that DCI format 2\_6 should not be counted in the existing DCI size budget (3+1) |
| CMCC | Support | It should be specified that DCI format 2\_6 are not counted in the DCI size budget. |
| Qualcomm | Support | We support separate accounting for DCI sizes within and outside the Active Time. The size of DCI format 2\_6 can be counted in the DCI size budget for “outside Active Time”. |
| Vivo | Support | We believe DCI format 2\_6 apart from existing DCI size budget is needed. Otherwise, the payload of DCI format 2\_6 may need to be padded to align with another DCI format. Thus, this will lead to bad link performance . And the definition of the ‘DCI size budget ‘ is understood regardless UE in active time or outside active time.  |
| Huawei, HiSilicon | Support | We are fine to clarify that the DCI format 2\_6 is not counted into the DCI size budget (3+1). |
| MediaTek | Support | We think excluding DCI format 2\_6 in DCI size budget calculation is beneficial for WUS performance because unnecessary DCI size alignment can be avoided. And we share the similar view as Nokia, there is no need to split the DCI size budget into “outside Active Time” and “inside Active Time”. Simply excluding DCI format 2\_6 in budget calculation is sufficient. |
| Samsung | Object | The proposal is against Rel-15 specifications – there is no differentiation for “inside” and “outside” Active Time. The proposal is also irrelevant to UE PS and applies to UEs that do not support UE PS and do not monitor DCI format 2\_6 (changes Rel-15 UE behavior).The proposal is unnecessary as the existing specifications are complete.* According to Clause 10.1 of TS38.213, UE counts the DCI format size based on a number of configured PDCCH candidates in respective search space sets, And TS 38.213 also states that *“The UE does not monitor PDCCH for detecting DCI format 2\_6 during Active Time [11, TS 38.321]”.* So, it’s clear that UE counts DCI format 2\_6 for DCI sizes only for outside Active Time.
* “not counted” is meaningless for a UE implementation. UE needs count DCI format 2\_6 if the UE is configured to monitor the DCI format 2\_6 according to the respective search space sets.
* The size of DCI format 2\_6 is configured by *sizeDCI-2-6-r16* as described in TS 38.331. There is no DCI size alignment for CSS.
 |
| OPPO | Support | Share same view with Nokia and MTK.We think excluding DCI format 2\_6 in DCI size budget calculation is beneficial for WUS performance because unnecessary DCI size alignment can be avoided. There is no need to split the DCI size budget into “outside Active Time” and “inside Active Time”. Simply excluding DCI format 2\_6 in budget calculation is sufficient. |
| ZTE | Support | If DCI format 2\_6 is counted in the existing (3+1) size budget, zero-padding is needed for the size alignment, the BLER performance may be impacted. Therefore, we think DCI format 2\_6 can be excluded from the size budget. And splitting the size budget into “outside Active Time ” and “within Active Time” is not needeed. |
| Ericsson | Support | This should be clarified to avoid negative impacts on DCI sizes monitored within Active time and to avoid DCI 2\_6 size enlargement, due to the text in 38.212, clause 7.3.1.0:*Step 3:**- If both of the following conditions are fulfilled the size alignment procedure is complete**- the total number of different DCI sizes configured to monitor is no more than 4 for the cell* *- the total number of different DCI sizes with C-RNTI configured to monitor is no more than 3 for the cell**<text omitted>**The UE is not expected to handle a configuration that, after applying the above steps, results in**- the total number of different DCI sizes configured to monitor is more than 4 for the cell; or*Based on discussion from 100bis-e, we updated our proposal to count budgets separately within and outside active time; however we are open to alternative way to resolve this.  |
| Intel | Support | We are fine to clarify this in specification |
| Apple | Support | We are fine with excluding DCI format 2\_6 from the DCI size budget. We do not see a need to split the size budget between “within” and “outside” the Active Time. |
| InterDigital | Support |  |
| SONY  | Support |  |
| ITRI | Support | We share same view with MTK. Excluding DCI format 2\_6 in DCI size budget calculation can avoid unnecessary DCI size alignment. For simplicity, excluding DCI format 2\_6 in budget calculation is sufficient. |

# Summary of Preparation

The common view is to further discuss 4 issues after the email discussion. The discussion also include the issue of collision of DCP and RAR addressed by C-RNTI from RAN2 LS R1-2003260. The reply LS to RAN2 would also be discussed. During email discussion, the issues of the monitoring RNTI in combination with PS-RNTI outside Active Time in Table 6.2-2 of TS38.202 were raised to be incosnsitent with RAN2 specifcation. The monitoring RNTI in combination with PS-RNTI would be discussed with collision of DCP and RAR together. If additional combination were agreed, TP to TS38.202 will be discussed subsequently.

Two email threads are proposed as follows,

[101-e-NR-NR\_UE\_Pow\_Sav-WUS-1] Collison of DCP and RAR

* Issue 2: Collision of RAR and DCP during RAR monitoring window (section 3.2)
	+ Discussion on issue raised in RAN2 LS R1-2003260 and reply LS by 5/28. The discussion will also include information from contributions in AI-5
		- R1-2003353 Discussion on DCP Open Issues vivo
		- R1-2003484 Draft reply LS on DCP Open Issues ZTE
		- R1-2003485 Discussion on collision between DCP and RAR ZTE
		- R1-2003587 Draft LS reply on DCP open issues CATT
		- R1-2003852 Draft reply LS on RAN2 DCP open issues Samsung
		- R1-2004113 Reply LS on RAN2 DCP Open Issues OPPO
		- R1-2004625 Draft reply LS on RAN2 DCP Open Issues Huawei, HiSilicon
		- R1-2004626 Discussion on the collision between DCP and RAR addressed to C-RNTI Huawei, HiSilicon
	+ UE PDCCH monitoring by other RNTI in combination with PS-RNTI outside Active Time
		- If agreed, whether TP is needed for TS38.202

[101-e-NR-NR\_UE\_Pow\_Sav-WUS-2] Specification clarification

* Issue 1: Whether to confirm Working Assumption of minimum time gap values (section 3.1)
* Issue 3: Specification alignment and text proposals (Section 3.3)
* Issue 4: DCI size budget for DCI format 2\_6 (Section 3.4)
	+ Clarification of the specification for DCI size alignment for DCI format 2\_6 outside Active Time

# Summary from contributions reviews

## Minimum time gap – values

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **RAN1#99 agreements**Agreements:sThe 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.

|  |
| --- |
| **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

|  |
| --- |
| **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  |

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.**

|  |
| --- |
| **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

|  |  |
| --- | --- |
| 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%3A%5CMy%20Documents%5C3gpp%5Cwg1-101%20e-meeting%5CR1-2003403.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.
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| 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.
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| MediaTek[5] | * + 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 |

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| 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
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| 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.
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| NEC [8] | * Using the unified wording “PCell or PSCell” is also recommended instead of “PCell or SpCell”.
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| 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.
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| 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.
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| 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.
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| 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.
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| AsusTek[13] | * Proposal: RAN1 adopts either TP1 or TP2 to avoid discrepancy on interaction between PHY and MAC on wake up indication
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| 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.
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| 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 |

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| 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”.
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| 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 |

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