**3GPP TSG-RAN WG1 #100bis-e R1-20xxxxx**

**e-Meeting, April 20th – 30th, 2020**

**Source: Ericsson**

**Title: Summary of email discussion [100b-e-NR- LTE\_NR\_DC\_CA-ScellDormancy-02]**

**Agenda item:** **7.2.10.3**

**Document for:** **Discussion and Decision**

# 1 Introduction

This document provides summary of email discussion [100b-e-NR- LTE\_NR\_DC\_CA-ScellDormancy-02] on following issues discussed during preparation phase of RAN1#100bis-eMeeting

Below are the topics (1-1/2/3/4/5) identified in [R1-2002739](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_100b_e/Inbox/R1-2002739.zip) [1]

* 1-1: Processing time and HARQ timing for Case 2 dormancy indication
* 1-2: UE behavior for SCells configured with dormant BWP when DCI 2-6 is not detected
* 1-3: Handling of CIF≠0 for Case 2 dormancy indication
* 1-4: Handling of “BWP indicator field” in DCI of SCell with dormant BWP
* 1-5: DCI format 1\_1/0\_1/2\_6 with dormancy indication only in first 3 symbols of a slot

# 2. Discussion

### 2.1 Topic 1-1

Please provide your input to below questions Q1-Q3 on this topic, preferably by 04/21 (evening PST).

#### Question 1

Q1. What should be the minimum processing time requirement for time between the end of Case 2 PDCCH with SCell dormancy indication and corresponding HARQ-ACK (please provide ‘full proposal’ as much as possible)?

Companies are requested to indicate their view about the above question in the Table below.

|  |  |
| --- | --- |
| **Company Name** | **Comments (1-1, Q1)** |
| vivo | We prefer to apply the same processing time requirement as SPS release PDCCH. The desirable HARQ-ACK feedback time of Case 2 PDCCH can be decided by gNB implementation considering the BWP switching gap and the UE processing time, by indicating a proper K1 value. |
| Panasonic | By reading some of the contributions touching this topic, it is understood the motivation to change/clarity the minimum processing time requirement is that the UE does not need to process PDSCH but only to deal with dormancy indication. Hence the minimum processing time requirement should not be longer than or even possibly smaller than current timeline as per the PDSCH processing capability.  Until decoding the DCI, UE does not know in advance whether the DCI format 1\_1 indicates (1) normal PDSCH scheduling, or (2) normal PDSCH scheduling + 5 Scell dormancy indication, or (3) no PDSCH scheduling but up to 15 SCell dormancy indication. So in our opinion, if UE determines the processing timeline before detecting the DCI, no special handling is needed and just reusing legacy cross-BWP scheduling requirement covering all the three case will work fine. |
| Nokia, NSB | Our preference is to keep the numbers as captured in the current specification, but we understand that for cross-carrier scheduling, supporting CIF≠0 for a case 2 dormancy DCI, some extra delay may be required. In any case we are not willing to accept numbers higher than in below proposal derived based on cross-carrier cross-numerology scheduling framework.  **Proposal 2**: *Minimum processing time requirement from the end of CASE2 PDCCH to HARQ-ACK is no larger and preferably smaller than*   * If *processingType2Enabled* of *PDSCH-ServingCellConfig* is set to *enable* for the serving cell with the PDCCH providing the DCI format 1\_1   + *12 symbols for*   + *15 symbols for*   + *27 symbols for*   + *34 symbols for* * *Otherwise,*    + *7 symbols for*   + *9.5 symbols for*   + *19 symbols for (FR1 only)* |
| Samsung | We think the minimum processing time defined in current specification is enough. The raised issue for HARQ-ACK dropping due to overlapped with interruption time can be avoided by proper PDSCH-to-HARQ feedback timing indication by gNB. |
| Ericsson | Our preference is to reuse SPS PDCCH release processing time as captured in current specification. |

#### Question 2

Q2. Is there a need to revert the RAN1 #100-e agreement on using SPS release PDCCH framework to define HARQ-ACK feedback for Case 2 SCell dormancy indication PDCCH, as proposed in [2]?

Companies are requested to indicate their view about the above question in the Table below.

|  |  |  |
| --- | --- | --- |
| **Company Name** | **Yes/No** | **Comments (1-1, Q2)** |
| vivo | No | We think the current framework can be kept and as commented above, the desirable HARQ-ACK feedback time of Case 2 PDCCH can be decided by gNB implementation considering the BWP switching gap and the UE processing time, by indicating a proper K1 value. |
| ZTE | No | We failed to see the motivation to revert the RAN1#100e agreement. |
| Panasonic | No | By gNB implementation the HARQ-ACK timing can cover the BWP switching gap. There is no strong need to revert the agreement. |
| Nokia, NSB | No | If gaps/interruptions are introduced to Pcell in RAN4 due to BWP change on Scells, gNB may avoid scheduling ACK on top of gap. -> up to gNB implementation. |
| Samsung | No | No need. Instead the related paragraph can be updated as below:  ===================== Proposed TP =======================  With reference to slots for PUCCH transmissions, if the UE detects a DCI format scheduling a PDSCH reception ending in slot  or if the UE detects a DCI format indicating a SPS PDSCH release or SCell dormancy without scheduling PDSCH reception through a PDCCH reception ending in slot , the UE provides corresponding HARQ-ACK information in a PUCCH transmission within slot , where  is a number of slots and is indicated by the PDSCH-to-HARQ\_feedback timing indicator field in the DCI format, if present, or provided by *dl-DataToUL-ACK*, or by *dl-DataToUL-ACKForDCIFormat1\_2* for DCI format 1\_2.  corresponds to the last slot of the PUCCH transmission that overlaps with the PDSCH reception or with the PDCCH reception in case of SPS PDSCH release. |
| Ericsson | No | We don’t see need to change - any interruptions if specified by RAN4 can be handled by gNB implementation. |

#### Question 3

Q3. Is there a need to send LS to RAN4 about this issue, as proposed in [3]?

Companies are requested to indicate their view about the above question in the Table below.

|  |  |  |
| --- | --- | --- |
| **Company Name** | **Yes/No** | **Comments (1-1, Q3)** |
| vivo |  | Not sure an LS is critical or not, but It would be good know RAN4 status of required switching delay and interruption gap due to transition between dormancy and non-dormancy BWP. |
| ZTE |  | We prefer not to send this LS.  We expect that once RAN4 has finished their work, RAN4 would send us the LS to inform us the outcome.  Currently, we are not sure about the intention/benefits of sending LS to RAN4. |
| Panasonic | No objection. | It is okay to send LS and acquire related outcome from RAN4. Anyway RAN4 may have better position to judge the SPS release HARQ-ACK timing requirement and potential impact from the BWP switching indicated by Scell dormancy indication. |
| Nokia, NSB | No | When RAN4 has something concrete on gaps/interruptions, they will send us LS. |
| Samsung | No | We don’t think LS is needed. |
| Ericsson | No | We don’t see a need to send LS to RAN4 - any interruptions if specified by RAN4 can be handled by gNB implementation. |

#### Draft Proposal

To be updated later

#### TP

To be updated later

### 2.2 Topic 1-2

Please provide your input to below questions Q1-Q2 on this topic, preferably by 04/21 (evening PST).

#### Question 1

Q1. According to current specification what is the UE behavior for the following scenario?

* UE behavior regarding which BWP to use for an SCell for an ON duration, when
  + the UE is configured with *ps-WakeUp*=true, and
  + the UE is configured with a dormant BWP for the SCell, and
  + the UE does not detect a DCI 2\_6 with SCell dormancy indication corresponding to the ON duration

Companies are requested to indicate their view about the above question in the Table below.

|  |  |
| --- | --- |
| **Company Name** | **Comments (1-2, Q1)** |
| vivo | The UE behavior according to the current spec is unclear, one interpretation could be that UE stay on the current BWP under the condition defined above. |
| ZTE | The current spec only defines UE behavior of wake up or not when DCI 2\_6 is mis-detected, while it is not clear which BWP to use for SCell for the next ON duration. |
| Panasonic | Although current specification does not explicitly address this scenario, UE shall wake up in high level as per the configuration by RRC, and operate in the current BWP. |
| LG | It is natural the UE follows dormancy behavior in the most latest active time |
| Nokia, NSB | If UE wakes-up when no WUS is received, UE continues in the same active BWP as before, all clear. Transition between active and non-active time in DRX does not change active BWP. Active BWP can be changed by receiving dormancy indication, BWPI or by RRC and inactivity timer. |
| Samsung | The UE behavior is unclear. In the above scenario, the UE will start DRX on duration timer, but does not know whether non-dormant BWP or dormant BWP is activated for the SCell configured with dormant BWP since the DCI format 2\_6 is missed. If this is not described in the specification, it would be just up to UE implementation. We prefer to resolve this issue. |
| Ericsson | According to current spec, UE continues in the same active BWP as before unless it receives an L1 indication to switch the BWP.  There is no agreement that psWakeUp should control dormancy/non-dormancy transition and the current spec is already aligned with below agreement.  Agreements:  If a DCI format 3\_0 outside Active Time is not detected by a UE, “UE wakeup or not” is configured by the higher layer signalling to address this case  The default is “not wake up” |

#### Question 2

Q2. For the following scenario, if the current specification is incorrect/unclear what should be the expected UE behavior?

* UE behavior regarding which BWP to use for an SCell for an ON duration, when
  + the UE is configured with *ps-WakeUp*=true, and
  + the UE is configured with a dormant BWP for the SCell, and
  + the UE does not detect a DCI 2\_6 with SCell dormancy indication corresponding to the ON duration

Companies are requested to indicate their view about the above question in the Table below.

|  |  |
| --- | --- |
| **Company Name** | **Comments (1-2, Q2)** |
| vivo | When the following condition is met   * + the UE is configured with *ps-WakeUp*=true, and   + the UE is configured with a dormant BWP for the SCell, and   + the UE does not detect a DCI 2\_6 with SCell dormancy indication corresponding to the ON duration   The expected UE behavior should be   * If the current BWP is non-dormant BWP, UE stays on the non-dormant BWP * If the current BWP is dormant BWP, UE switches to the non-dormant BWP provided by *first-non-dormant-BWP-ID-for-DCI-outside-active-time*   When the following condition is met   * + the UE is configured with *ps-WakeUp*=false, and   + the UE is configured with a dormant BWP for the SCell, and   + the UE does not detect a DCI 2\_6 with SCell dormancy indication corresponding to the ON duration   The expected UE behavior should be   * UE stays on the current BWP. |
| ZTE | UE switches to non-dormant BWP for all the activated SCell when  the UE is configured with ps-WakeUp=true, and  the UE is configured with a dormant BWP for the SCell, and  the UE does not detect a DCI 2\_6 with SCell dormancy indication corresponding to the ON duration  The reason is: If network configures “wake-up” as the default UE behavior, network cares more about the system performance. From this perspective, it makes sense to follow the same philosophy, i.e., switch to non-dormant BWP for all the activated SCells in case of miss detection of DCI 2\_6. |
| Panasonic | We think UE shall wake up in this case as this is default behavior as per RRC parameter *ps-WakeUp*=true. Also UE shall switch to the *first-non-dormant-BWP-ID-for-DCI-inside-active-time.* |
| LG | It may be better to clarify the behavior in the specifications |
| Nokia, NSB | No need for clarification |
| Samsung | We prefer to define a default UE behavior for the above scenario. The default UE behavior on dormancy should be controlled by gNB as wake-up behavior. In addition, we need to define the default UE behavior not only for the case of *ps-WakeUP*=true but also the case of *ps-WakeUP* is not provided. To minimize the performance loss due to the miss-detection, we think vivo’s proposal is reasonable. |
| Ericsson | Spec is clear and we don’t see a need to specify new behavior. |

#### Draft Proposal

To be updated later

#### TP

To be updated later

### 2.3 Topic 1-3

Please provide your input to below questions Q1-Q2 on this topic, preferably by 04/21 (evening PST).

#### Question 1

Q1. According to current specification what is the UE behavior for the following scenario

* UE is configured with CIF, and detects DCI format 1-1 on primary cell with CIF≠0 and FDRA bits set according to Case 2 SCell dormancy indication.

Companies are requested to indicate their view about the above question in the Table below.

|  |  |
| --- | --- |
| **Company Name** | **Comments (1-3, Q1)** |
| vivo | Current spec does not prevent to indicate CIF≠0 for a case 2 dormancy DCI, however, it is not clear what is the use case for gNB to do so. |
| ZTE | The current spec is clear that CIF≠0 could be configured for Case 2 SCell dormancy indication. With CIF≠0, network could use the candidates for SCell to transmit the Case2 DCI. |
| Panasonic | According to the current specification, there is no explicit exclusion of using CIF≠0 when UE performs SCell dormancy behavior as per the indication in DCI format 1\_1. |
| LG | If we clarify that CIF≠0’is not used, no further definition of the UE behavior is necessary |
| Nokia, NSB | Current spec and agreements support CIF≠0 for a case 2 dormancy DCI. Not sure what behavior needs to be defined. |
| Samsung | The specification is clear. The UE will assume that the received DCI format 1-1 as the dormancy indication although CIF≠0. |
| Ericsson | Spec does not preclude it, i.e. UE should follow the indication in the DCI. There is no strong use case for supporting it though. |

#### Question 2

Q2. Is ot OK to agree to below proposal (discussed in RAN1#100-e)?

* When UE is configured with CIF, DCI format 1-1 on primary cell with CIF≠0’is not used for Case 2 SCell dormancy indication

Companies are requested to indicate their view about the above question in the Table below.

|  |  |  |
| --- | --- | --- |
| **Company Name** | **Yes/No** | **Comments (1-3, Q2)** |
| Vivo | Yes | UE does not expect to detect a DCI format for Case 2 SCell dormancy indication with CIF≠0, the reason could be   1. There is no use case to do so 2. UE could use CIF field as a validation of the DCI |
| ZTE | No | We believe that allowing CIF≠0 for Case2 DCI could improve the scheduling flexibility, e.g., network could use the candidates for SCell to transmit the Case2 DCI in PCell. |
| Panasonic | No | Do not see strong need to add this. By adding this may better align between gNB and UE but also need additional DCI validation at UE side and also corresponding test cases. Unless there is some other concern, e.g. for other usage in the future CIF≠0 is reserved, otherwise no need to change the specification. |
| LG | Yes |  |
| Nokia, NSB | No\* | This would be reverting the previous agreement, and nothing is broken in the spec. \*However, if cross-carrier scheduling restriction would help chipsets to keep current HARQ-ACK timeline used for DL SPS release, we are willing to reconsider. |
| Samsung | No | This is an optimization not a critical issue. |
| Ericsson | Yes | Although it is in the spec, there is no strong use case for supporting it and we don’t see the need to optimize this use case or add other clarifications related to it in the spec. |

#### Draft Proposal

To be updated later

#### TP

To be updated later

### 2.4 Topic 1-4

Please provide your input to below questions Q1-Q2 on this topic, preferably by 04/21 (evening PST).

#### Question 1

Q1. According to current specification what is the UE behavior for the following scenarios A and B?

* UE is configured with a dormant BWP for an Scell and
  + A) the ‘BWP indicator field’ in PDCCH DCI format 1-1 detected for the Scell indicates a BWP ID corresponding to dormant BWP
  + B) the ‘BWP indicator field’ in PDCCH DCI format 0-1 detected for the Scell indicates BWP ID corresponding to dormant BWP

Companies are requested to indicate their view about the above question in the Table below.

|  |  |
| --- | --- |
| **Company Name** | **Comments (1-4, Q1)** |
| vivo | The current specification seems to allow case A) and B). |
| ZTE | As the PDSCH-Config/PDCCH-Config will not be configured for the dormant BWP, the current spec implies that ‘BWP indicator field’ in PDCCH DCI format 1-1 could not be indicated as the dormant DL BWP.  If UE is under dormant DL BWP, UE cannot receive any DCI, thus there is no such case as the second bullet above described.  Based on the above analysis, Case A) and Case B) are not allowed in the current specficiation. |
| Panasonic | In our understanding, UE shall perform the PDSCH reception, PUCCH transmission or PUSCH transmission in the target BWP according to the DCI and then go to dormancy behavior in the dormant BWP. UE does not need to monitor PDCCH in the dormant BWP. |
| Nokia, NSB | For A) UE would need to know how to interpret DCI format fields according to dormant BWP, but pdsch-Config in dormant BWP would not contain configurations necessary to interpret DCI fields. For B), there is no UL dormant BWP configured, as per RAN2 agreement. -> **both cases are broken in our opinion, but no need to specify stupid gNB behavior.** 😉 |
| Samsung | Scenario A) The UE behavior is unclear. First, the UE cannot identify most of DCI fields which derived from PDSCH-Config since there is no PDSCH-Config for dormant DL BWP. For example, it is not defined in the current specification, how the UE assume FDRA field size when the *resourceAllocation* is not provided to the UE. In addition, it is unclear that how the UE can decide whether the received DCI format is valid or not. According to 38.213, if a UE detects a DCI format with inconsistent information, the UE discards all the information in the DCI format. Therefore, we need to further study how the UE can handle the remaining fields other than BWP indicator. Therefore, to minimize the specification impact, we prefer not to allow switching to dormant DL BWP by using legacy DL BWP indicator field.  Scenario B) This is valid only for TDD not for FDD. For TDD, a UL BWP can be linked with the dormant DL BWP. For the UL BWP, PUSCH-Config would not be provided. Therefore, similar issue observed in scenario A will be happened. Therefore, it is preferred not to allow switch to UL BWP linked with dormant DL BWP by using legacy UL BWP indicator field. |
| Ericsson | Such indication would be inconsistent with the behavior in 38.321, subclause 5.15.1. The BWP Indicator field in the DCI for the Scell cannot be used to switch the UE to the dormant BWP of the Scell. |

#### Question 2

Q1. If the current specification is incorrect/unclear for the following scenarios A and B, what should be the expected UE behavior?

* UE is configured with a dormant BWP for an SCell and
  + A) the ‘BWP indicator field’ in PDCCH DCI format 1-1 detected for the SCell indicates a BWP ID corresponding to dormant BWP
  + B) the ‘BWP indicator field’ in PDCCH DCI format 0-1 detected for the SCell indicates BWP ID corresponding to dormant BWP

Companies are requested to indicate their view about the above question in the Table below.

|  |  |
| --- | --- |
| **Company Name** | **Comments (1-4, Q2)** |
| vivo | UE should not expect case A) or B) to happen, i.e. defined as error case. |
| ZTE | The current spec seems fine. |
| Panasonic | So far no substantial issue is identified to change the specification. |
| Nokia, NSB | no need to specify stupid gNB behavior |
| Samsung | Based on the observation in Q1, we can consider two alternatives as below:  Alt-1) UE is not expected to be indicated BWP switch to dormant DL BWP by using legacy BWP indicator field.  Alt-2) The BWP indicator field does not include the dormant DL BWP.  We think Alt-2 is the best choice since it basically excludes a potential error case at all and minimize the DCI field size.  For scenario A, for both TDD and FDD, the BWP indicator field can be composed of the configured DL BWPs except for the dormant DL BWP.  For scenario B, for TDD, the BWP indicator field can be composed of the configured UL BWPs except for the UL BWP linked with dormant DL BWP. For FDD, any change is not needed. |
| Ericsson | gNB cannot set the BWP Id bit to dormant BWP, so it is an extra bit that is never used.  Our preference is to not have a BWP indicator field in the DCI on the Scell when the Scell has only one RRC configured non-dormant BWP, i.e. not use dormant BWP in the BWP indicator field length calculation. We think this is cleanest option. Otherwise, we can keep spec as is. |

#### Draft Proposal

To be updated later

#### TP

To be updated later

### 2.5 Topic 1-5

Please provide your input to below questions Q1 on this topic, preferably by 04/21 (evening PST).

#### Question 1

Q1. Is there a need to introduce a condition that UE expects to receive DCI format 0-1/1-1/2-6 with SCell dormancy indication on the primary cell only in the first 3 symbols of a slot?

Companies are requested to indicate their view about the above question in the Table below.

|  |  |  |
| --- | --- | --- |
| **Company Name** | **Yes/No** | **Comments (1-5, Q1)** |
| vivo | Yes, but except DCI format 2-6 | It is reasonable to restrict DCI 0-1/1-1 with SCell dormancy indication on the PCell only in the first 3 symbols.  However, it is unnecessary to add the restriction to DCI 2-6, because the minimum gap between the last DCI 2-6 monitoring occasion and DRX onduration can naturally support the potential dormancy BWP switching. |
| ZTE | Yes | There could be different Options for this issue.  Option1: If the DCI format 0-1/1-1/2-6 indicates SCell dormancy, the DCIs are expected to be within the first 3 symbols of a slot.  Option2: If the DCI format 0-1/1-1/2-6 indicates SCell dormancy **change**, the DCIs are expected to be within the first 3 symbols of a slot.  For Option1, regardless of whether the BWP of SCell has been changed or not, the DCIs are expected to be within the first 3 symbols of a slot as long as the DCIs are used for dormancy indication.  For Option2, the DCIs are expected to be within the first 3 symbols of a slot only if the DCIs are triggering BWP change for at least one SCell. Otherwise, no such kind of restriction.  Option2 is more aligned with the legacy spec description. We are open to further discuss the two options. |
| Panasonic | No | So far no strong reason is identified to do so. If concern is from BWP switching latency requirement due to SCell dormancy indication, we may need some input from RAN4. |
| Nokia, NSB | Depends | Agree with Vivo. For DCI 0-1/1-1, we are generally fine, particularly, if it helps to maintain R15 BWP switching time-line. However, so far no news from RAN4 😊 |
| Samsung | No | We don’t think the first 3-symbol restriction is not needed. It is defined for legacy BWP switching to ensure the enough time gap to preparation to transmit or received data in the new BWP. However, dormant BWP switching is just for BWP switching without any scheduling data. Therefore, we don’t think such a restriction is not needed. |
| Ericsson | No | Having such restriction increases dormancy/non-dormancy latency. From UE perspective, transition delay is the main issue which is being discussed in RAN4. Also, for DCI 2\_6, there are quite a bit of scheduling restrictions to place the search spaces before an On duration, and we prefer to avoid additional restrictions. |

#### Draft Proposal

To be updated later

#### TP

To be updated later

# 3 Conclusions

To be updated later

# 4 References

1. [R1-2002739](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_100b_e/Inbox/R1-2002739.zip) Summary of efficient and low latency serving cell configuration/activation/setup, Moderator (Ericsson), RAN1#100bis-e, April 2020.
2. [R1-2002560](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_100b_e/Docs/R1-2002560.zip) Remaining issues for SCell dormancy Qualcomm Incorporated
3. [R1-2002185](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_100b_e/Docs/R1-2002185.zip) Remaining issues on SCell dormancy behavior MediaTek Inc.