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

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

**Agenda Item: 5**

**Source: OPPO**

**Title:** **Summary for reply LS on Scell dormancy**

**Document for:** **Discussion**

# Introduction

This contribution is summarising the answer to LS [1] for Scell Dormancy. Contributions from the [1-17] are as basis to be discussed on.

# Questions of Scell dormancy

View for the questions from different sources are listed as bellow:

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| **Q 1: Are there any issues due to RAN2 agreements on TCI state configuration, i.e. *tci-StatesToAddModListat* in PDSCH-Config is configured for dormant BWP?** |

There are issues: Ericsson

No issue: ZTE, vivo, OPPO, MTK, Futurewei, LGE, Nokia, Qualcomm, Intel, Samsung

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| Company | Comments |
| OPPO | Since the TCI state is configured in PDSCH-config, the supporting of TCI state to CSI-RS will require that configuration. In case only the TCI state configured in PDSCH-Config, it will not rise issue to the dormancy BWP for RAN1. |
| Futurewei | It is unclear what “*tci-StatesToAddModListat*” refers to since it cannot be found in the specs. We assume it is a typo for “*tci-StatesToAddModList*”. Furthermore, it is unclear why the LS states “It seems that both *pdsch-ConfigCommon* IE and *pdsch-Config* IE cannot be configured for the dormant BWP”. If these IEs cannot be configured according to some agreement, then the field *tci-StatesToAddModList* cannot be configured as this field is within *pdsch-Config* IE. Assume there is no such an agreement to prevent *pdsch-Config* IE from being configured, we see no problem with *tci-StatesToAddModList* being configured within *pdsch-Config* IE for a dormant BWP. |
| Qualcomm | There is no issue if TCI state is configured in PDSCH-Config in dormant BWP. |
| vivo | No issue |
| ZTE | No issue |
| Ericsson | We agree that it should be possible to configure *tci-StatesToAddModList* in dormant BWP. However, as discussed in R1-2002420, RAN1 should indicate to RAN2 that any IE that is necessary for ensuring proper UE behaviour in dormant BWP should be allowed to be present as part of *PDSCH-Config* of dormant BWP as long as it doesn’t conflict with dormant BWP related behaviour specified in 38.321 subclause 5.15.1. For example, since CSI measurement for the dormant BWP is supported, it should also be possible to provide “*DMRS-DownlinkConfig*” for the dormant BWP via *dmrs-DownlinkForPDSCH-MappingTypeA/ dmrs-DownlinkForPDSCH-MappingTypeB* for CSI reference resource definition as described in sub-clause 5.2.2.5 of 38.214. Such approach is also more forward compatible for dormant BWP operation (as opposed to specifying that only parameters xyz are allowed).In summary, we propose following reply:**A:** RAN1 agrees that it should be possible to configure *tci-StatesToAddModList* in dormant BWP. RAN1 understanding is that it should be possible for the NW to configure any IE that is necessary for ensuring proper UE behaviour in dormant BWP as part of *PDSCH-Config* of dormant BWP, as long as the configuration does not conflict with dormant BWP related behaviour specified in 38.321 subclause 5.15.1. |
| CATT  | No issue |
| LG | No issue |
| Samsung | No issue |
| Huawei, HiSi | No issue |
| MTK | No issue |

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| **Q 2: Are there any issues due to RAN2 agreements for BFR, i.e. BFR is supported and BFR procedure follow R16 SCell BFR procedure for dormant BWP, then *radioLinkMonitoringConfig* IE and new IE *beamFailureRecoverySCellConfig* for Scell BFR are configured in DL dormant BWP configuration for beam failure detection purpose?** |

There are issues: Huawei, LGe, Ericsson

No issue: ZTE, vivo, OPPO, MTK, Futurewei, Nokia, Qualcomm, Intel, Samsung

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| Company | Comments |
| OPPO | There is no issue for supporting BFR in dormant Scell. At least explicit configuration of BFR RS can be supported. |
| Futurewei | For DL beam management, as long as there is active UL from any other CC available to transmit the beam failure recovery request, we see no issue to support dormant Scell BFR. Since at least the Pcell UL is always active, the Rel-16 BFR procedure works. |
| Qualcomm | There is no issue. |
| Vivo | No issue |
| ZTE | No issue. |
| Ericsson | We are OK with RAN2 agreement that BFR is supported in dormant BWP. However, since there is no PDCCH monitoring on dormant BWP, the Scell BFR procedure for an Scell with dormant BWP should end with UE reporting of LRR/radio link quality. If this is common understanding, it should be included in response to RAN2. |
| CATT  | No issue |
| LG | For BFR, RAN1 and RAN4 specifications define a constraint that the BFD RS should be a QCL RS for PDCCH, which means that BFR is for checking the quality of ‘PDCCH beam’. Therefore, existing Rel-15/16 BFR framework requires PDCCH configuration, where dormant BWP is not configured with any PDCCH. Given that regular beam management is supported on dormant BWP, the usage/necessity of BFR on dormant BWP needs to be firstly clarified for RAN1 to make necessary changes in the spec |
| Samsung | No issue. |
| Huawei, HiSi | As explained in [R1-2002680](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_100b_e/Docs/R1-2002680.zip) and also explained by Ericsson and LG2, the RAN2 agreements seem to be made procedure-wise and does not consider the rational of BFR operation that was defined in RAN1, in terms of the need of radio link quality QCLed to PDCCH DMRS. Therefore it is questionable the procedure would work well performance-wise. If the group consider that using explicitly configuration without QCL to PDCCH DMRS is acceptable, this should be explicitly mentioned in the reply LS to RAN2. |
| MTK | No issue |

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| **Q 3: Are there any issues due to RAN2 agreements on CSI reporting and SRS transmission, i.e. not support aperiodic CSI reporting for dormant BWP and not support SRS transmission on dormant BWP?** |

There are issues for no SRS transmitted in dormant BWP: CATT, Huawei, Futurewei, ZTE, Samsung

There are issues for no A-CSI reported in dormant BWP: CATT, Ericsson, Futurewei

No issue: vivo, OPPO, MTK, LGE, Nokia, Qualcomm, Intel

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| Company | Comments |
| OPPO | AP CSI reporting cannot be triggered by the dormant SCell due to disabling PDCCH in dormant BWP. It could be triggered by other cells. Alternatively, the periodic CSI can be supported in dormant BWP. Not supporting AP CSI reporting and AP SRS in dormant SCell will not rise any further issues. |
| Futurewei | There are problems with the conclusions related to Q3:* This may have significant RAN1 impact that are not discussed in RAN1;
* RAN1 may have time to only agree on a design with small L1 impact;
* With all UL transmission stopped on a dormant BWP:
	+ - DL full MIMO CSI and UL CSI become unavailable
		- UL TA, UL PC, and UL beam management may be impacted for Scenario 1 where the dormant SCell does not share RF/PA with a non-dormant SCell, which further impact DL/UL throughput performance after leaving dormancy
		- Power saving cannot be achieved for Scenario 2 where the dormant SCell shares RF/PA with a non-dormant SCell
		- This may also need RAN4 input, especially related to out-of-dormancy transition latency.

Suggested Reply:RAN1 recommends allowing some UL transmissions to be configurable for a dormant BWP:* P-SRS, AP-SRS
* FFS AP CSI reporting
 |
| Qualcomm | There is no issue if UE does not transmit AP CSI or SRS on dormant BWP. |
| vivo | Aperiodic CSI reporting triggered by Pcell may be considered if the triggering offset is large so that power saving benefit is not compromised. Suggest further discussion in RAN1 on the support of A-CSI for dormancy BWP. No issue with not supporting SRS.  |
| ZTE | In addition to CRI-RS, we propose to support periodic SRS transmission in case the DL BWP is switched to dormant BWP.The DL&UL beam management is crucial for timely DL&UL scheduling after SCell switching to non-dormant BWP. DL beam management can be performed on CSI-RS and UL beam is expected to be performed on SRS. Based on RAN2’s agreements, periodic CSI-RS can be transmitted in the dormant BWP to track the DL beam. In addition to periodic CSI-RS, UE needs to support at least periodic SRS transmission in case the DL BWP is switched to dormant BWP to track the UL beam. |
| Ericsson | It is OK to not support transmission of AP CSI report on dormant BWP. However, disallowing AP CSI report for measurement made on dormant BWP (with report triggered by e.g. PCell) is a significant restriction from NW perspective. The justification given in RAN2 LS for this restriction (i.e., “UE power saving concern”) is unclear. Due to this restriction, there will be an A-CSI measurement/reporting delay in addition to the dormant to non-dormant BWP switch delay to start data scheduling on non-dormant BWP. One of the main motivations of introducing SCell dormancy was reduced latency and the restriction on AP-CSI measurements goes against it. Allowing AP-CSI measurement on dormant BWP allows the NW to keep the UE in a ready-to-schedule state when there is data. As discussed in R1-2002420, there is no UE power saving concern due to AP-CSI measurements in Scell dormant BWP since the NW can provide sufficient time-offset between AP-CSI trigger and corresponding CSI-RS resource (i.e., using existing RRC parameters *aperiodicTriggeringOffset* and *minimumSchedulingOffset*). In summary, we propose following replyA: From RAN1 perspective, it is OK to not support AP-CSI report transmission on dormant BWP but AP-CSI report for measurement made on dormant BWP (with report triggered by e.g. PCell) should be supported. Not supporting this increases latency between dormancy and start of data scheduling on non-dormant BWP. In RAN1 understanding, there is no “UE power saving concern” due to AP-CSI measurements in Scell dormant BWP, as the NW can provide sufficient time-offset between AP-CSI trigger and corresponding CSI-RS resource (i.e., using existing RRC parameters *aperiodicTriggeringOffset* and *minimumSchedulingOffset*). |
| CATT | The SCell dormancy is for UE not to monitor PDCCH on the indicated SCell for power saving purpose but to keep the SCell activated and updated channel information for link adaptation. The aperiodic CSI reporting and SRS transmission on the dormant BWP are important aspects for gNB to be able to schedule UE on the SCell after it is transitioned from dormant SCell to non-dormant SCell. The A-CSI measurement and SRS transmission are critical for radio channel information, which captures short-term channel information and associated variation. Although UE would not monitor PDCCH on the dormant BWP of the SCell, the A-CSI could be triggered and reported on the PCell or a non-dormant SCell. Since DL and UL BWPs are independently configured and indicated, SRS transmission is UL transmission and is irrelevant to the status of DL BWP whether it is a dormant or non-dormant DL BWP. Thus, it is important to have A-CSI measurement and SRS transmission on the dormant SCellA-CSI reporting and SRS transmission should be supported for DL dormant BWP.  |
| LG | No issue.Aperiodic triggering of CSI/SRS is not relevant to dormant BWP operation since UE does not monitor any DCI scheduling the dormant BWP. In addition, periodic SRS transmission in a dormant BWP is not motivated sufficiently considering motivation of UE dormancy operation. Therefore, RAN2 agreements are reasonable in RAN1 perspective as well. |
| Samsung | No issue for no A-CSI reporting.There is some minor RAN1 specification impact for no SRS transmission especially in case of that SRS carrier switching triggered by DCI format 2\_3. We need to further clarify that how the order of SRS transmissions for the serving cells is decided when some of the serving cells are dormant.  |
| Huawei, HiSi | UL transmission by SRS is very important for maintaining UL channel quality and UL sync and is also important for acquiring DL channel conditions in TDD system. At least the periodic SRS transmission should be supported on the dormant BWP with minimized spec impact. |
| MTK | Aperiodic CSI and aperiodic SRS are used for improving DL data efficiency. Since there is no DL data scheduling in case of SCell dormancy, **not supporting aperiodic CSI and aperiodic SRS as current RAN2 agreements seem reasonable**. Also, **not supporting AP CSI/SRS is important for UE power saving** since otherwise UE would need to stay aware to the possible AP CSI/SRS measurement/transmission all the time and cannot achieve power saving.On the other hand, maintaining periodic CSI and periodic SRS could aid to maintain link quality to ensure a fast return to data transfer. Therefore, we recommend to support periodic SRS instead of current RAN2 decision which does not support any SRS transmission. |

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| **Q4: RAN2 wonder what the scenario is to define the two first non-dormant BWPs which may be configured to be different?** |

The scenario for defining the two first non-dormant BWPs: vivo (Independent configuration), OPPO (different requirements, not strong need), Futurewei (Capability differences)

No scenario for two first non-dormant BWPs: ZTE, MTK, Nokia, Huawei, Intel, CATT, Qualcomm, Samsung

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| Company | Comments |
| OPPO | From RAN1 perspective, the 2 cases are defined separately and targeting on different scenarios. One is for the WUS detection and DRX ON. The other is for the active time which you can switching to non-dormant by a DCI. Thus the WUS case results in both DRX ON and a non-dormant BWP which may need a ramp up time. However, there is not fundamental problem to have single configurable parameter for both of the case. |
| Futurewei | Dormancy support inside active time (which is via UE-specific DCI format 0\_1/1\_1 on PCell) and dormancy support outside active time (which is via WUS mechanism and group-common DCI format 2\_6) are different UE capabilities. A UE may support one but not the other. |
| Qualcomm | We do not see a strong motivation and do not see a significant issue if two first non-dormant BWPs are configured. This allows network to have a second chance to configure a different first non-dormant BWP within DRX active time after it has sent the SCell dormancy indication in PDCCH WUS. This may cause higher signalling error probability if UE missed the second SCell dormancy indication within DRX active time.  |
| vivo | Based on the current RAN1 UE feature list, dormancy indication by DCI inside active time and dormancy indication by WUS outside active time are separate feature groups, a given UE may only support one of the two. Therefore the RRC configuration should be kept separated. For a UE supporting both feature groups, then gNB can configure the two “first-non-dormancy-ID” to be the same |
| ZTE | We did not figure out the specific use case for the separate configuration. |
| Ericsson | Specific scenarios were not discussed in RAN1 - it provides full flexibility to the NW by keeping separate configuration for inside and outside active time. |
| CATT | There is no discussion on the specific scenario in RAN1. However, RAN1 agreed that the non-dormant BWPs outside and within Active Time can be independently but not necessary to be different. When the non-dormant BWPs within and outside Active Time are different, UE needs to perform BWP switching during the transition. The BWP switching would account additional power consumption and latency. There are no results in justifying the extra power saving gain when a narrower BW is configured for dormant BWP outside Active Time comparing to that within Active Time .  |
| LG | We don’t see a special need to revert RAN1 agreements on having separate RRC configuration of the first non-dormant BWP for outside active time and inside active time.Therefore, RAN1 keep the proposal of separate RRC configuration of the first non-dormant BWP for outside active time and inside active time. |
| Samsung | It is just for providing flexibility to the gNB. There is no strong motivation to have it. |
| MTK | We see no obvious scenario. Single first-non-dormancy DL BWP inside/outside active time should be sufficient. |

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| **Q5: If these two first non-dormant BWPs are configured to be different, is it possible that the NW and UE may be out of sync in terms of which BWP the UE is using in non-dormancy if the UE has transitioned out of dormancy earlier?** |

The out of sync problem can happen due to missing one of dormant indications.

Yes: OPPO, vivo, MTK, Futurewei, LGE, Qualcomm, Huawei, Intel, Samsung

No: CATT, Nokia

This out of sync is general problem of miss-detection and can be corrected by NW: OPPO, vivo, Futurewei, LGE, Qualcomm

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| Company | Comments |
| OPPO | If the two first non-dormant BWPs configured differently, the triggering of BWPs would be also in different occasions. A first non-dormant BWP will be tried to triggered by WUS outside of active time. If failed, it will not go the that designated BWP. That will result in potential missing of PDCCH in the BWP. However, that can be corrected by the dormancy switching during the active time from PCell.It should be also noted that the missing of dormancy indication inside of active time or outside of active time is commonly happen and may need some general behaviour but not for the specific case. |
| Futurewei | There were discussions that WUS DCI may be repeated in time, which may reduce the likelihood of misdetection of the out-of-dormancy transition command in the WUS DCI. Regardless, there is always a small probability that a DCI is mis-detected and the network needs to rely on its implementation to identify and correct the error. Note that even if there is only one first non-dormant BWP configured to the SCell, it is still possible that the network and the UE are out of sync in terms of whether the SCell is in dormancy or not. |
| Qualcomm | If UE missed the second PDCCH within active time, UE will switch to the wrong BWP on the SCell. This impact can be mitigated by using DCI format 1\_1 without data scheduling for dormancy indication, since there will be HARQ-ACK feedback form UE for this DCI. |
| vivo | The issue due to miss detection by the UE may happen for WUS DCI, or case 1/2 dormancy indication using DCI within active time, there is a possibility to cause different understanding between gNB and UE regarding the current active BWP. Such case may happen even though UE is only enabled with dormancy indication by WUS DCI outside active time, or case 1/2 dormancy indication inside active time, and RAN1 expect gNB implementation should be able to handle such ambiguity due to miss detection of DCI.  |
| ZTE | Based on the reply to Q4, there is no strong motivation to configure the two first non-dormant BWPs as different BWPs. From RAN1 perspective, one RRC parameter to configure the first non-dormant BWP is sufficient, which applies to both outside DRX-active-time dormancy indication and inside DRX-active-time dormancy indication. |
| Ericsson | Such problems and any resulting impact can be handled by NW implementation. Intention of RAN2 questions is not clear as the LS also states “RAN2 will take the RAN1 agreements into account”. Overall, we do not see this as a ‘critical’ issue to discuss and while not a having strong view, we prefer to keep the current RAN1 agreed RRC parameters. |
| CATT | The UE behaviour of wakeup or not due to miss-detection of the DCI format 2\_6 is configured by the gNB. If the UE is configured to wake up when the CRC check of DCI format 2\_6 fails on all monitoring occasions, UE will follow Rel-15 behavior, which UE monitors PDCCH on PCell and SCell(s) at next DRX ON. It implies that BWP will be switched to non-dormant BWP while UE is configured to wake up when WUS is miss-detected. If the UE is configured not to wake up when WUS is miss-detected, UE will not monitor the PDCCH on all cells. gNB and UE will not have any misunderstanding on the BW of dormant BWP at any time. |
| LG | There can be a situation where gNB and UE have misalignment on the current active non-dormant BWP if UE misses gNB’s dormancy/non-dormancy indication when the first non-dormant BWPs configured for outside active time and inside active time are different. However, no further specification is necessary to handle this potential error case |
| Samsung | There can be misunderstanding on the current active BWP when UE misses the corresponding DCI. |
| MTK | To avoid this issue, single first-non-dormancy DL BWP inside/outside active time should be used. |

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| **Q6:RAN2 respectfully ask RAN1 is it feasible to support the implicit configuration of the beam failure detection RS for dormant BWP?** |

Need the configurability of implicit configuration for beam failure detection RS in dormant BWP:

Yes: ZTE, vivo, MTK, Futurewei (in one scenario), Nokia, Qualcomm, Intel

No: OPPO, LGE, CATT, Huawei, Futurewei (in a different scenario), Samsung

Feasibility other than using PDCCH-config: Futurewei (An intra-band non-dromant Scell), Nokia (Overlapped non-dormant BWP), Qualcomm/Intel/Ericsson (Active TCI state of a CORESET of the first non-dormant BWP)

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| Company | Comments |
| OPPO | RAN1 would assume there is not PDCCH monitoring in the dormant BWP. The key issue is to save significant power consumption in SCell. The changing of PDCCH TCI state in dormant BWP cannot be used for that PDCCH in dormant BWP. There would be further issues, including power consumption, if we configured implicit BFR RS for dormant BWP. |
| Futurewei | * It is feasible to support the implicit configuration of the beam failure detection RS for the dormant SCell if there is a non-dormant serving cell within the same band with *PDCCH-Config IE* configured.
* It is NOT feasible to support the implicit configuration of the beam failure detection RS for the dormant SCell if there is not a non-dormant serving cell within the same band with *PDCCH-Config IE* configured.
 |
| Qualcomm | Implicit BFR RS s feasible and important for dormant BWP for power saving purpose. Regarding the TCI-state for PDCCH, not monitoring PDCCH can also be achieved by network not configuring search space in the dormant BWP. For example, network configures *PDCCH-config* which only contains *controlResourceSetToAddMod/ReleaseList*, and the UE uses RS in *tci-StatesPDCCH-ToAddList* in each of the configured *ControlResourceSet* for BFD. An alternative solution is that the implicit BFD RS can be the RS in TCI state of PDCCH in the first non-dormant BWP. |
| vivo | Implicit BFD RS determination is based on the PDCCH-config, therefore RAN1 expect PDCCH-config IE should be provided otherwise implicit BFD RS cannot be used. We DO NOT agree with the solutions listed in A6 in section 3, if needed, we could consider to allow PDCCH-config for dormancy BWP without search space.  |
| ZTE | Based on the following RAN1 spec (highlighted part), either with explicit configuration or implicit configuration, network needs to configure and activate TCI-State for PDCCH for dormant BWP, e.g., it can be achieved by providing *tci-StatesPDCCH-ToAddList* field in PDCCH-Config and UE ignores other fields included in *PDCCH-Config*. From RAN1 perspective, it is feasible to support the implicit configuration of the beam failure detection RS for dormant BWP.

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| The physical layer in the UE assesses the radio link quality according to the set q\_0 of resource configurations against the threshold Qout,LR. For the set q\_0, the UE assesses the radio link quality only according to periodic CSI-RS resource configurations or SS/PBCH blocks that are quasi co-located, as described in [6, TS 38.214], with the DM-RS of PDCCH receptions monitored by the UE. The UE applies the Qin,LR threshold to the L1-RSRP measurement obtained from a SS/PBCH block. The UE applies the Qin,LR threshold to the L1-RSRP measurement obtained for a CSI-RS resource after scaling a respective CSI-RS reception power with a value provided by powerControlOffsetSS.  |

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| Ericsson | If BFR is supported with dormant BWP, we prefer to also support implicit BFR RS monitoring as the explicit BFR RS approach can result in frequent RRC reconfigurations. We would be OK to specify the implicit BFD RS as the RS given by PDCCH TCI state of first non-dormant BWP. |
| CATT | Implicit RS configuration of the beam failure detection RS would work if the dormant BWP is encompassed by another non-dormant BWP. Explicit configuration of BFD-RS, such as CSI-RS, could be used for the channel measurement and beam management measurement for BFR. The implicit configuration is a special case.  |
| LG | Since PDCCH is not configured for dormant BWP, it is not feasible to use the implicit configuration of the BFD RS following the existing Rel-15/16 specifications |
| Samsung | Implicit RS configuration cannot be workable for dormant DL BWP since there is no PDCCH configuration. We do not prefer to add any new features to support the implicit RS configuration for dormant DL BWP at this late stage. This is not critical and system is not broken since it can be totally manageable by gNB. The gNB just can ensure explicit RS configuration for the dormant DL BWP. |
| MTK | Since the original assumption for SCell dormancy is that UE keeps the same CSI and beam related behavior as non-ormant case, we see it **feasible to support** the implicit configuration of the beam failure detection RS for dormant BWP. |

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| **Q7:RAN2 respectfully ask RAN1 to decide whether the default BWP can be same as dormant BWP?** |

The default BWP can be dormant BWP: ZTE, vivo, MTK, Futurewei, LGE, Nokia, Eircsson, LGE

The default BWP cannot be dormant BWP: OPPO, CATT, Qualcomm, Huawei, Intel, Samsung

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| Company | Comments |
| OPPO | RAN1 has only considered case that default BWP is not the dormant BWP. |
| Futurewei | The standards should allow the default BWP to be same as dormant BWP, and the network can determine how to configure the default BWP via network implementation. The related RAN1 agreement is the following and no other restriction is agreed:Agreements:* *If the default BWP is not the dormant BWP, BWP inactivity timer is not used for transitioning from dormant BWP to another BWP*
 |
| Qualcomm | Dormant BWP should not be the default BWP for two reasons* Default BWP is used to resolve the out-of-sync of active BWP between gNB and UE so that UE can switch back to default BWP and receive downlink control and data again.
* Unsynchronized BWP switch due to timer expiration can be avoided for dormant BWP given SCell dormancy DCI triggers synchronous BWP switch between dormancy and non-dormancy
 |
| vivo | From RAN1 perspective, the default BWP and dormancy BWP can be configured independently so they can be same or different. Note there was following agreement in RAN1#99 assuming they can be different. Agreements:*If the default BWP is not the dormant BWP, BWP inactivity timer is not used for transitioning from dormant BWP to another BWP* |
| ZTE | We see no issue to configure the default BWP the same as dormant BWP. Actually, configuring default BWP as dormant BWP offers a timer-based BWP switching for UE to switch from non-dormant BWP to dormant BWP. |
| Ericsson | According to current RAN1 understanding, default BWP may or may not be same as dormant BWP and this aspect is up to NW implementation. |
| CATT  | Default BWP can not be the dormant BWP since default BWP is the fallback BWP of the SCell for UE to receive PDCCH.  |
| LG | It is up to gNB if it wants to configure a dormant BWP as the default BWP.No further specification works are necessary on this point. |
| Samsung | Dormant BWP should not be the default BWP. The original fallback functionality by using default BWP should not be hurt. |
| Huawei, HiSi | Though specification wise there is no RAN1 limitation, from operation point of view it is needed to avoid same BWP as default BWP. Up to network handling potentially leads to technical problem that can be easily avoided by explicitly limitation.  |
| MTK | We see the default BWP **can be same as** dormant BWP. The motivation of defining default BWP is to allow network to reach UE and align BWP index. However, when UE supports SCell dormancy, network can always indicate SCell to switch in/out the dormant BWP via PCell signalling. Hence, there is no issue supporting the default BWP to be the same as dormant BWP. |

# Proposed answers

To address the RAN2’s questions, following answers are proposed for replying the LS. A reply LS will be prepared based on the conclusion of those answers.

For question 1~2, it should be clear there is no significant problem is proven in RAN1 perspective. Some specification adjustment can be allowed for properly support the configuration. For question 3, slight majority view is there is no issues and RAN1 did not have common understanding of the loss without A-CSI and SRS in dormant BWP. For the question 4&5, they are actually related. It was not well discussed except the RRC parameter list to separate the 2 non-dormant BWPs. However, separated configuration or single configuration all don’t have much problem. For the question 6, it is more about if we should support implicit BFD RS configuration based on the Rel-16 BFD behaviour on Scell. Some additional information for how to fulfil the feasibility by the potential candidate solutions could be useful.

In summary, the proposed replies to RAN2 are:

**A1.** No issue is identified by RAN1.

A1 (Alt 2 proposal). RAN1 agrees that it should be possible to configure *tci-StatesToAddModList* in dormant BWP. RAN1 understanding is that it should be possible for the NW to configure any IE that is necessary for ensuring proper UE behaviour in dormant BWP (e.g. *dmrs-DownlinkForPDSCH-MappingTypeA/ dmrs-DownlinkForPDSCH-MappingTypeB*) as part of *PDSCH-Config* of dormant BWP, as long as the configuration does not conflict with dormant BWP related behaviour specified in 38.321 subclause 5.15.1.

**A2.** No issue is identified by RAN1.

**A3.** No issue is identified by RAN1.

A3 (Alt 2 proposal). From RAN1 perspective, it is OK to not support AP-CSI report transmission on dormant BWP but AP-CSI report for measurement made on dormant BWP (with report triggered by e.g. PCell) should be supported. Not supporting this increases latency between dormancy and start of data scheduling on non-dormant BWP. In RAN1 understanding, there is no “UE power saving concern” due to AP-CSI measurements in Scell dormant BWP, as the NW can provide sufficient time-offset between AP-CSI trigger and corresponding CSI-RS resource (i.e., using existing RRC parameters *aperiodicTriggeringOffset* and *minimumSchedulingOffset*).[RAN1 view on A-SRS should also be included here based on the outcome of the discussion]

**A4.** Scenarios for defining the two first non-dormant BWPs, one for outside of active time and another for insider of active time, are flexibility of configuration, different UE capabilities, different requirements etc.

**A5.** The out of sync case can happen if UE is configured with two different first non-dormant BWPs. However, the cause of the out of sync is general problem by miss-detection and it can be fixed by the network.

**A6:**

Implicit configuration for beam failure detection RS in dormant BWP should be supported. One of the feasible solution is configure PDCCH-config in dormant BWP and use RS in *tci-StatesPDCCH-ToAddList* in each of the configured *ControlResourceSet* for beam failure detection.

If there is no PDCCH-config in dormant BWP, implicit configuration of the beam failure detection RS for dormant BWP could be supported by:

An intra-band non-dormant Scell is configured with the Scell with dormant BWP.

The dormant BWP is overlapped by a non-dormant BWP.

Implicit BFD RS can be the RS in TCI state of PDCCH in the first non-dormant BWP.

**A7:** The default BWP can be dormant BWP.

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