**3GPP TSG RAN WG1 e-Meeting #101 R1-2004971**

**May 25th – June 5th, 2020**

Agenda Item: 7.2.7.2

Source: Moderator (MediaTek)

Title: Summary#3 for Procedure of Cross-Slot Scheduling Power Saving Techniques

Document for: Discussion and Decision

# Introduction

In RAN1 #100-Bis e-meeting [1], two email threads are carried out to address the remaining issues for Rel-16 cross-slot scheduling adaptation, and the outcomes are summarized in the feature lead summary [2]. From the summary, the following remain to be resolved in this meeting:

1. TP to clarify the application timing of a K0min/K2min change indicated by a cross-carrier scheduling that is before the DCI indicating active BWP change to a target BWP of different numerology in the scheduling cell.
2. For an active BWP with scheduling offset restriction(s) configured and when UE detects an invalid TDRA entry violating current applied K0min/K2min from DCI format 1\_0/0\_0, one of the following is decided in RAN1 #101-e meeting:
	* Alt 1: Additional RAN1 specification is defined for handling such error case
		+ Solution to be converged from companies’ proposals to RAN1 #101-e
	* Alt 2: No additional RAN1 specification is defined for handling such error case

To complete the maintenance, companies’ views on other remaining issues will also be summarized. The above items will be addressed in the following sections with suggested proposals/conclusion for further email discussion.

# TP to Clarify Application Timing

As noted in [2], there is a TP remaining to be decided:

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| Agreements (RAN1 #101b-e):For DCI scheduling PDSCH or PUSCH and indicating active BWP change,* (Working assumption) K0/K2 is no smaller than max(K0min/K2min of source BWP, BWP switch delay)
	+ Numerology conversion is applied to K0min/K2min in case of numerology change between target BWP and source BWP.
* The indicated K0min/K2min of target BWP is always applied starting from the slot of PDSCH or PUSCH scheduled by the DCI
* Clarify the application timing of a K0min/K2min change indicated by a cross-carrier scheduling that is before the DCI indicating active BWP change to a target BWP of different numerology in the scheduling cell.
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| For 3rd item: Clarify the application timing of a K0min/K2min change indicated by a cross-carrier scheduling that is before the DCI indicating active BWP change to a target BWP of different numerology in the scheduling cell. For this agreement item, there is no consensus on the applied TP. Since this clarification has been agreed, it remains to discuss/specify the corresponding TP in next RAN1 meeting (#101-e). |

To assist the understanding, Figure 1 illustrates the case for clarifying the application timing:



Figure 1: Illustration of the case for clarifying the application timing

In Table 1, there summarize companies’ views on clarifying the application time for the case illustrated in Figure 1. There are 8 companies expressing their views, wherein 6 companies suggest TP, and 2 companies suggest only to note the timing for the numerology when calculating the application delay. Since clarification of the application timing is already agreed in RAN1 #100-Bis-e, it is more straightforward to capture explicit clarification in Section 5.3.1 of TS 38.214:

Proposal 1: To clarify the timing related information in Section 5.3.1 of TS 38.214, discuss and decide the following TP.

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| 5.3.1 Application delay of the minimum scheduling offset restriction<omitted text>When the UE is scheduled with DCI format 0\_1 or 1\_1 with a ‘Minimum applicable scheduling offset indicator’field in slot *n*, it shall determine the *K*0min and *K*2min values to be applied, while the previously applied *K*0min and *K*2min values are applied until the new values take effect. If the DCI in slot *n* also indicates an active DL (UL) BWP change for a serving cell, the indicated *K*0min (*K*2min) value in the new active DL (UL) BWP, if configured, is applied from the slot indicated by the slot offset value of the time domain resource assignment field in the DCI. Otherwise, change of applied minimum scheduling offset restriction indication carried by DCI in slot *n*, shall be applied in slot *n*+*X* of the scheduling cell. The UE does not expect to be scheduled with DCI format 0\_1 or 1\_1 with ‘Minimum applicable scheduling offset indicator’ field indicating another change to the applied *K*0min and *K*2min for the same active BWP before slot *n+X* of the scheduling cell. If there is active DL BWP change in the scheduling cell after a change indication to a scheduled cell by cross-carrier scheduling in slot *n*, the application delay is converted as where is the numerology of the active DL BWP of the scheduling cell when sending the change indication in slot *n*, and is the numerology of the new active DL BWP of the scheduling cell.<omitted text> |

Table 1: Companies’ views for the TP to clarify the application timing for the case illustrated in Figure 1

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| Company | View(s)/Suggested TP |
| ZTE | **Proposal 1: Adopt the following Text proposal.**----------------------------- Text Proposal for 38.214 clause 5.3.1------------------------------------When the UE is scheduled with DCI format 0\_1 or 1\_1 with a ‘Minimum applicable scheduling offset indicator’field in slot *n*, it shall determine the *K*0min and *K*2min values to be applied, while the previously applied *K*0min and *K*2min values are applied until the new values take effect. If the DCI in slot *n* also indicates an active DL (UL) BWP change for a serving cell, the indicated *K*0min (*K*2min) value in the new active DL (UL) BWP, if configured, is applied from the slot indicated by the slot offset value of the time domain resource assignment field in the DCI. Otherwise, change of applied minimum scheduling offset restriction indication carried by DCI in slot *n*, shall be applied in slot *n*+*X* of the scheduling cell. The slot index n+X is converted to  for cross-carrier scheduling, if active DL BWP change is finished in the scheduling cell before the indicated *K*0min (*K*2min) value in the scheduled cell is applied, where  is the numerology of the active DL BWP of the scheduling cell when receiving the DCI in slot n, and  is the numerology of the new active DL BWP of the scheduling cell. The UE does not expect to be scheduled with DCI format 0\_1 or 1\_1 with ‘Minimum applicable scheduling offset indicator’ field indicating another change to the applied *K*0min and *K*2min for the same active BWP before slot *n+X* of the scheduling cell. ------------------------------- Text Proposal for 38.214 clause 5.3.1--------------------------------- |
| HW | ***Observation 1:*** ***The slot definition for the application delay X is the same as that for slot n, which corresponds to the numerology of the active DL BWP of the scheduling cell receiving the DCI. Numerology conversion of application delay X is not needed to be specified in the specification.******Proposal 2: Adopt TP1 to clarify the numerology of the slot used to define the application delay X.***--------------------------------------- Start of Text Proposal 1------------------------------------------< Unchanged parts are omitted >5.3.1 Application delay of the minimum scheduling offset restrictionWhen the UE is scheduled with DCI format 0\_1 or 1\_1 with a ‘Minimum applicable scheduling offset indicator’field in slot *n*, it shall determine the *K*0min and *K*2min values to be applied, while the previously applied *K*0min and *K*2min values are applied until the new values take effect. If the DCI in slot *n* also indicates an active DL (UL) BWP change for a serving cell, the indicated *K*0min (*K*2min) value in the new active DL (UL) BWP, if configured, is applied from the slot indicated by the slot offset value of the time domain resource assignment field in the DCI. Otherwise, change of applied minimum scheduling offset restriction indication carried by DCI in slot *n*, shall be applied in slot *n*+*X* of the scheduling cell. The UE does not expect to be scheduled with DCI format 0\_1 or 1\_1 with ‘Minimum applicable scheduling offset indicator’ field indicating another change to the applied *K*0min and *K*2min for the same active BWP before slot *n+X* of the scheduling cell.When the DCI format 0\_1 or 1\_1 with [‘Minimum applicable scheduling offset indicator’**]** field indicating a change to the applied *K*0min or *K*2min is contained within the first three symbols of slot *n*, the value of application delay *X* is determined by, where *K*0minOld is the currently applied *K*0min value of the active DL BWP in the scheduled cell, and *Zµ* is determined by the subcarrier spacing of the active DL BWP in the scheduling cell in slot *n*, and given in Table 5.3.1-1 and *µ*PDCCH and *µ*PDSCH are the sub-carrier spacing configurations for PDCCH in slot *n* and PDSCH, respectively< Unchanged parts are omitted >------------------------------------------ End of Text Proposal 1---------------------------------------- |
| CATT | ***Proposal 2: For Clause 5.3.1 of TS 38.214, the numerology conversion should be based on X only.  It could have a simple change as following:***

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| --------- Unchanged parts are omitted (Section 5.3.1 of TS 38.214-g10) ------------When the UE is scheduled with DCI format 0\_1 or 1\_1 with a ~~[~~'Minimum applicable scheduling offset indicator'~~]~~field, it shall determine the *K*0min and *K*2min values to be applied, while the previously applied *K*0min and *K*2min values are applied until the new values take effectafter application delay. Change of applied minimum scheduling offset restriction indication carried by the DCI in slot *n*, shall be applied in slot *n*+*X* of the scheduling cell. The UE does not expect to be scheduled with DCI format 0\_1 or 1\_1 with ~~[~~'Minimum applicable scheduling offset indicator'~~]~~ field indicating another change to the applied *K*0min and *K*2min for the same active BWP before slot *n+X* of the scheduling cell. The value *X* is based on the numerology of scheduled PDSCH according to the conversion when numerology changes.-------------------------------- Unchanged parts are omitted ---------------------------- |

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| MTK | Proposal 2: The following TP is incorporated to Section 5.3.1 of TS 38.214:

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| 5.3.1 Application delay of the minimum scheduling offset restriction<omitted text>When the UE is scheduled with DCI format 0\_1 or 1\_1 with a ‘Minimum applicable scheduling offset indicator’field in slot *n*, it shall determine the *K*0min and *K*2min values to be applied, while the previously applied *K*0min and *K*2min values are applied until the new values take effect. If the DCI in slot *n* also indicates an active DL (UL) BWP change for a serving cell, the indicated *K*0min (*K*2min) value in the new active DL (UL) BWP, if configured, is applied from the slot indicated by the slot offset value of the time domain resource assignment field in the DCI. Otherwise, change of applied minimum scheduling offset restriction indication carried by DCI in slot *n*, shall be applied in slot *n*+*X* of the scheduling cell. The UE does not expect to be scheduled with DCI format 0\_1 or 1\_1 with ‘Minimum applicable scheduling offset indicator’ field indicating another change to the applied *K*0min and *K*2min for the same active BWP before slot *n+X* of the scheduling cell. If there is active DL BWP change in the scheduling cell after a change indication to a scheduled cell by cross-carrier scheduling in slot *n*, the application delay is converted as where is the numerology of the active DL BWP of the scheduling cell when sending the change indication in slot *n*, and is the numerology of the new active DL BWP of the scheduling cell.<omitted text> |

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| Intel | **Proposal 1: If a cross-carrier scheduling DCI in slot *n* indicates change of *K0min* and/or *K2min* in scheduled cell and another DCI received in slot *n1* , where *n1* > *n*, triggers active DL BWP change in the scheduling cell, then the change of *K*0min and/or *K*2min in scheduled cell would be applied in slot if > , otherwise in slot in the new active DL BWP of the scheduling cell. Here,**  **is the numerology of the active DL BWP of the scheduling cell when receiving the DCI in slot n, and is the numerology of the new active DL BWP.*** **Note: This is applicable when slot index *n+X* indicates a time after active BWP change in scheduling cell.**
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| Samsung | **Proposed TP for TS 38.214 [2]**

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| 5.3.1 Application delay of the minimum scheduling offset restriction================================= Unchanged part is omitted ===============================When the DCI format 0\_1 or 1\_1 with ['Minimum applicable scheduling offset indicator'**]** field indicating a change to the applied *K*0min or *K*2min is contained within the first three symbols of the slot, the value of application delay *X* is determined by, 𝑋 = 𝑚𝑎𝑥 (⌈𝐾0𝑚𝑖𝑛𝑂𝑙𝑑 ∙ 2𝜇𝑃𝐷𝐶𝐶𝐻 2𝜇𝑃𝐷𝑆𝐶𝐻 ⌉ , 𝑍𝜇 ) where *K*0minOld is the currently applied *K*0min value of the active DL BWP in the scheduled cell, and *Zμ* is determined by the subcarrier spacing of the active DL BWP in the scheduling cell, and given in Table 5.3.1-1 and *μ*PDCCH and *μ*PDSCH are the sub-carrier spacing configurations for PDCCH providing the DCI format and PDSCH, respectively |

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| CMCC | **Proposal 1. The new k0/k2min will be applied in slot of the scheduling cell after the BWP change in scheduling cell, where the and is the numerology of the new active DL BWP in scheduling cell and is numerology of the active DL BWP in scheduling cell.****The text proposal for TS 38.214 is as the following:**5.3.1 Application delay of the minimum scheduling offset restriction<omitted text>When the UE is scheduled with DCI format 0\_1 or 1\_1 with a ‘Minimum applicable scheduling offset indicator’field in slot *n*, it shall determine the *K*0min and *K*2min values to be applied, while the previously applied *K*0min and *K*2min values are applied until the new values take effect. If the DCI in slot *n* also indicates an active DL (UL) BWP change for a serving cell, the indicated *K*0min (*K*2min) value in the new active DL (UL) BWP, if configured, is applied from the slot indicated by the slot offset value of the time domain resource assignment field in the DCI. Otherwise, change of applied minimum scheduling offset restriction indication carried by DCI in slot *n*, shall be applied in slot *n*+*X* of the scheduling cell. The UE does not expect to be scheduled with DCI format 0\_1 or 1\_1 with ‘Minimum applicable scheduling offset indicator’ field indicating another change to the applied *K*0min and *K*2min for the same active BWP before slot *n+X* of the scheduling cell. The slot index n+X is converted to , if needed after active DL BWP change in the scheduling cell, where is the numerology of the active DL BWP of the scheduling cell when receiving the DCI in slot n, and is the numerology of the new active DL BWP.<omitted text> |
| Qualcomm | Proposal 4: In the specification (TS 38.214, Section 5.3.1), the conversion of the application delay for cross-carrier scheduling, when an active DL BWP change is triggered on the scheduling cell before the application delay ends, should be clarified.============TP for TS 38.214 Section 5.3.1===================================--Unchanged part omitted------------------------When the UE is scheduled with DCI format 0\_1 or 1\_1 with a ‘Minimum applicable scheduling offset indicator’field in slot *n*, it shall determine the *K*0min and *K*2min values to be applied, while the previously applied *K*0min and *K*2min values are applied until the new values take effect. If the DCI in slot *n* also indicates an active DL (UL) BWP change for a serving cell, the indicated *K*0min (*K*2min) value in the new active DL (UL) BWP, if configured, is applied from the slot indicated by the slot offset value of the time domain resource assignment field in the DCI. Otherwise, change of applied minimum scheduling offset restriction indication carried by DCI in slot *n*, shall be applied in slot *n*+*X* of the scheduling cell. The UE does not expect to be scheduled with DCI format 0\_1 or 1\_1 with ‘Minimum applicable scheduling offset indicator’ field indicating another change to the applied *K*0min and *K*2min for the same active BWP of the scheduled cell before slot *n+X* of the scheduling cell. The slot *n*+*X* is converted to , if needed, after an active DL BWP change in the scheduling cell that is triggered by another DCI at or after slot *n*, where is the numerology of the active DL BWP of the scheduling cell when receiving the DCI in slot *n*, and is the numerology of the new active BWP of the scheduling cell.--Unchanged part omitted------------------------====================================================================== |
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# Error Handling when Detecting Invalid TDRA entry from Fallback DCI

In RAN1#101-Bis-e, the following agreement requires further discussion and decision:

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| Agreements (RAN1#100-Bis-e):For an active BWP with scheduling offset restriction(s) configured and when UE detects an invalid TDRA entry violating current applied K0min/K2min from DCI format 1\_0/0\_0, one of the following is decided in RAN1 #101-e meeting:* Alt 1: Additional RAN1 specification is defined for handling such error case
	+ Solution to be converged from companies’ proposals to RAN1 #101-e
* Alt 2: No additional RAN1 specification is defined for handling such error case
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In Table 2, there summarize companies’ views on error handling when detecting invalid TDRA entry from fallback DCI. There are 16 companies expressing views, wherein 8 companies support Alt 1 and 8 companies support Alt 2. Regarding that it is maintenance phase for Rel-16 and consensus proposal looks not feasible, the best way forward is to capture the current situation as a conclusion:

Conclusion 1: RAN1 has no consensus in specifying additional UE behavior when receiving an invalid TDRA entry violating the applied K0min/K2min from DCI format 1-0/0-0.

Table 2: Companies’ views on error handling when detecting invalid TDRA entry from fallback DCI

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| Company | Alt 1/2 | View(s)/Suggested TP |
| VIVO | 1 | **Proposal 2: UE applies lowest indexed minimum scheduling offset when the UE detects an invalid entry in TDRA table at least in fallback DCI, i.e. Alt 1 is proposed. TP in Appendix 1 in R1-2003404 should be adopted.** |
| ZTE | 1 | **Proposal 2: For an active BWP with scheduling offset restriction(s) configured and when UE detects an invalid TDRA entry violating current applied K0min/K2min from DCI format 1\_0/0\_0, UE should fall back to same-slot scheduling.** |
| HW | 2 | ***Observation 2: No additional RAN1 specification is needed considering no reason/justification is identified to specify the UE behavior when the UE detects an invalid TDRA entry.*** |
| CATT | 2 | ***Proposal 1: it is an implementation issue and no need of further resolution that UE receive invalid TDRA entry.***  |
| MTK | 2 | **Observation 1: The probability that gNodeB cannot re-align UE for missed K0min and K2min indication should be low under reasonable deployment/coverage.****Observation 2: Existing error handling schemes, including BWP time-out or RRC reconfiguration can be used to resolve this error case. Since the probability of such error case is low, the latency of reusing existing solutions is acceptable.****Proposal 2: For an active BWP with scheduling offset restriction(s) configured and when UE detects an invalid TDRA entry violating current applied K0min/K2min from DCI format 1\_0/0\_0, the following Alt is suggested:*** Alt 2: No additional RAN1 specification is defined for handling such error case
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| Intel | 2 | **Proposal 2: No additional RAN1 specification is defined for handling the error case when invalid TDRA entry is detected in DCI format 0\_0/1\_0.** |
| Samsung | 1 | ***Proposal 2: Alt 1 is supported for the issue below:**** For an active BWP with scheduling offset restriction(s) configured and when UE detects an invalid TDRA entry violating current applied K0min/K2min from DCI format 1\_0/0\_0, one of the following is decided in RAN1 #101-e meeting:
	+ Alt 1: Additional RAN1 specification is defined for handling such error case
		- Solution to be converged from companies’ proposals to RAN1 #101-e
	+ Alt 2: No additional RAN1 specification is defined for handling such error case

**Proposed TP for TS 38.214 [2]**

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| 5.1.2.1 Resource allocation in time domain==================== Unchanged part is omitted ====================When the UE configured with [*minimumSchedulingOffset*] in an active DL BWP it applies a minimum scheduling offset restriction indicated by the **[**‘Minimum applicable scheduling offset indicator’]field in DCI format 0\_1 or 1\_1. When the UE configured with [*minimumSchedulingOffset*] in active DL BWP and it has not received [‘Minimum applicable scheduling offset indicator’] field in DCI format 0\_1 or 1\_1, UE shall apply a minimum scheduling offset restriction indicated based on [‘Minimum applicable scheduling offset indicator’] value ‘0’. When the *minimum scheduling offset restriction* is applied the UE is not expected to be scheduled with a DCI in slot *n* to receive a PDSCH scheduled with C-RNTI, CS-RNTI or MCS-C-RNTI with *K*0 smaller than the applicable minimum scheduling offset restriction *K*0min. If a UE is indicated a *K*0 value smaller than the applicable minimum scheduling offset restriction *K*0min by DCI format 1\_0, the UE shall apply a minimum scheduling offset restriction indicated based on [‘Minimum applicable scheduling offset indicator’] value ‘0’.==================== Unchanged part is omitted ====================6.1.2.1 Resource allocation in time domain==================== Unchanged part is omitted ====================When the UE configured with [*minimumSchedulingOffset*] in active UL BWP it applies a minimum scheduling offset restriction indicated by the [‘Minimum applicable scheduling offset indicator’] field in DCI format 0\_1 or 1\_1. When the UE configured with [*minimumSchedulingOffset*] in active UL BWP and it has not received [‘Minimum applicable scheduling offset indicator’] field in DCI format 0\_1 or 1\_1, the UE shall apply a minimum scheduling offset restriction indicated based on [‘Minimum applicable scheduling offset indicator’] value ‘0’. When the *minimum scheduling offset restriction* is applied the UE is not expected to be scheduled with a DCI in slot *n* to transmit a PUSCH scheduled with C-RNTI, CS-RNTI or MCS-C-RNTI with *K*2 smaller than the applicable minimum scheduling offset restriction *K*2min in slot *n*. If a UE is indicated a *K*2 value smaller than the applicable minimum scheduling offset restriction *K*2min by DCI format 0\_0, the UE shall apply a minimum scheduling offset restriction indicated based on [‘Minimum applicable scheduling offset indicator’] value ‘0’.==================== Unchanged part is omitted ==================== |

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| CMCC | 2 | **Proposal 2. Alt 2: No additional RAN1 specification is defined for handling such error case is supported for an active BWP with scheduling offset restriction(s) configured and when UE detects an invalid TDRA entry violating current applied K0min/K2min from DCI format 1\_0/0\_0.** |
| Spreadtrum | 2 | ***Proposal 1: No additional RAN1 specification is defined for handling such error case.*** |
| LG | 1 | **Proposal 1: A UE assumes no scheduling offset restriction when invalid TDRA entry is indicated from DCI format 0\_0/1\_0.** |
| OPPO | 2 | **Proposal: No additional RAN1 specification is defined for handling invalid TDRA entry from DCI format 0\_0/1\_0.** |
| Sony | 1 | **Proposal 1: If the UE receives DCI format 0\_0 / 1\_0 with invalid TDRA entries, the UE updates its *K0min* / *K2min* values based on those TDRA entries**.**Proposal 2: If the UE receives DCI format 1\_0 with an invalid TDRA entry, the UE responds with a PUCCH indicating NACK for the associated PDSCH**.**Observation 1: If the gNodeB transmits DCI format 0\_0 with an invalid TDRA entry, the UE will not respond with PUSCH and the gNodeB will not know whether the UE has updated its *K0min* / *K2min* or not**. |
| InterDigital | 1 | ***Proposal 1: When the UE is scheduled with a DCI to receive a PDSCH scheduled with C-RNTI, CS-RNTI or MCS-C-RNTI with K0 smaller than the applicable minimum scheduling offset restriction K0min, UE shall apply a minimum scheduling offset restriction indicated based on ['Minimum applicable scheduling offset indicator'] value '0'.******Proposal 2: When the UE is scheduled with a DCI to transmit a PUSCH scheduled with C-RNTI, CS-RNTI or MCS-C-RNTI with K2 smaller than the applicable minimum scheduling offset restriction K2min, UE shall apply a minimum scheduling offset restriction indicated based on ['Minimum applicable scheduling offset indicator'] value '0'.******Proposal 3: When the UE is triggered by CSI triggering state indicated by the CSI request field in DCI in which CSI-RS triggering offset is smaller than the currently applicable minimum scheduling offset restriction K0min, UE shall apply a minimum scheduling offset restriction indicated based on ['Minimum applicable scheduling offset indicator'] value '0'.***Text Proposals (38.214):5.1.2.1 Resource allocation in time domain…When the UE configured with [minimumSchedulingOffset] in an active DL BWP it applies a minimum scheduling offset restriction indicated by the **[**'Minimum applicable scheduling offset indicator']field in DCI format 0\_1 or 1\_1. When the UE configured with [minimumSchedulingOffset] in active DL BWP and it has not received ['Minimum applicable scheduling offset indicator'] field in DCI format 0\_1 or 1\_1, UE shall apply a minimum scheduling offset restriction indicated based on ['Minimum applicable scheduling offset indicator'] value '0'. When the minimum scheduling offset restriction is applied the UE is not expected to be scheduled with a DCI in slot n to receive a PDSCH scheduled with C-RNTI, CS-RNTI or MCS-C-RNTI with K0 smaller than the applicable minimum scheduling offset restriction K0min. When the UE is scheduled with a DCI to receive a PDSCH scheduled with C-RNTI, CS-RNTI or MCS-C-RNTI with *K*0 smaller than the applicable minimum scheduling offset restriction *K*0min, UE shall apply a minimum scheduling offset restriction indicated based on ['Minimum applicable scheduling offset indicator'] value '0'. The minimum scheduling offset restriction is not applied when PDSCH transmission is scheduled with C-RNTI, CS-RNTI or MCS-C-RNTI in common search space associated with CORESET0 and default PDSCH time domain resource allocation is used or when PDSCH transmission is scheduled with SI-RNTI or RA-RNTI. The application delay of the change of the minimum scheduling offset restriction is determined in Clause 5.3.1.6.1.2.1 Resource allocation in time domain**…**When the UE configured with [minimumSchedulingOffset] in active UL BWP it applies a minimum scheduling offset restriction indicated by the ['Minimum applicable scheduling offset indicator'] field in DCI format 0\_1 or 1\_1. When the UE configured with [minimumSchedulingOffset] in active UL BWP and it has not received ['Minimum applicable scheduling offset indicator'] field in DCI format 0\_1 or 1\_1, the UE shall apply a minimum scheduling offset restriction indicated based on ['Minimum applicable scheduling offset indicator'] value '0'. When the minimum scheduling offset restriction is applied the UE is not expected to be scheduled with a DCI in slot n to transmit a PUSCH scheduled with C-RNTI, CS-RNTI or MCS-C-RNTI with K2 smaller than the applicable minimum scheduling offset restriction K2min in slot n. When the UE is scheduled with a DCI to transmit a PUSCH scheduled with C-RNTI, CS-RNTI or MCS-C-RNTI with *K*2 smaller than the applicable minimum scheduling offset restriction *K*2min, UE shall apply a minimum scheduling offset restriction indicated based on ['Minimum applicable scheduling offset indicator'] value '0'. The minimum scheduling restriction is not applied when PUSCH transmission is scheduled by RAR UL grant for RACH procedure, or when PUSCH is scheduled with TC-RNTI. The application delay of the change of the minimum scheduling offset restriction is determined in Clause 5.3.1.5.2.1.5 Triggering/activation of CSI Reports and CSI-RS**…**The UE does not expect that aperiodic CSI-RS is transmitted before the OFDM symbol(s) carrying its triggering DCI. When the minimum scheduling offset restriction is applied, UE is not expected to be triggered by CSI triggering state indicated by the CSI request field in DCI in which CSI-RS triggering offset is smaller than the currently applicable minimum scheduling offset restriction *K*0min. When the UE is triggered by CSI triggering state indicated by the CSI request field in DCI in which CSI-RS triggering offset is smaller than the currently applicable minimum scheduling offset restriction *K*0min, UE shall apply a minimum scheduling offset restriction indicated based on ['Minimum applicable scheduling offset indicator'] value '0'. |
| Ericsson | 2 | Proposal 2: No additional RAN1 specification needs to be defined for handling the case when a UE detects K0/K2 value less than K0min/K2min value. |
| NTT DOCOMO | 1 | Proposal 2: If the UE is indicated invalid TDRA entry by DCI format 0\_0 or 1\_0, UE applies the K0min/K2min value with the lowest index of configured minimum scheduling offset restriction. |
| Nokia | 1 | **Observation 1:** Adding UE behaviour to handle slot offset violation could facilitate the system operation in case of missed detection.**Observation 2:** UE behaviour in handling the slot offset violation should not restrict network configuration flexibility.***Proposal 2:*** *(If behaviour is introduced) When UE detects K0<K0min (or K2<K2min) in DCI 1\_0 (or 0\_1), UE should:** *If two values are configured to MinSchedulingOffsetK0-Values-r16, UE changes the current applied minimum scheduling offset value, or*
* *If single values is configured to MinSchedulingOffsetK0-Values-r16 UE disables use of minimum slot offset restriction*
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# Other Remaining Issues

In addition to the above two remaining issues from RAN1 #100-Bis-e, companies’ views on other remaining issues are further summarized in Table 3, and below please check the list of 7 remaining issues of larger number of supporting companies. Among the 7 listed issues, the first 4 are suggested for further discussion in this meeting. The later 3 issues are not suggested since either it can be avoided by network configuration or Rel-16 can still work without it.

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| Remaining issue | Num. | Supporting companies | Suggestion |
| A | minimumSchedulingOffset 🡪 minimumSchedulingOffsetK0/K2 | 7 | HW, HiSilicon, CATT, MTK, Spreadtrum, OPPO, Ericsson | TP to 7.3.1 of TS 38.212 and 5.2.1.5.1 of TS 38.214 |
| B | Clarification for application delay | 6 | ZTE, HW, HiSilicon, MTK, OPPO, QC | TP to 5.3.1 of TS 38.214 |
| C | Confirm working assumptions | 6 | VIVO, MTK, CMCC, NTT DOCOMO, QC, Nokia | Confirm the 3 working assumptions for R16 |
| D | Clarification of UE assistance info | 4 | MTK, Ericsson, QC, Nokia | Same-carrier scheduling suggestion is applied for cross-carrier scheduling |
| E | The minimum scheduling offset restriction is not applied when default PDSCH time domain resource allocation is used | 3 | Samsung, LG, OPPO | No further discussion is suggested as network can configure dedicated TDRA table and avoid such case |
| F | Matched #scheduling offset restriction across all DL and UL BWPs | 3 | HW, HiSilicon, Spreadtrum | No further discussion is suggested as this can be avoided by network configuration |
| G | 7. Whether DCI format 0\_2/1\_2 can include the 1-bit indication | 3 | Nokia (Yes), CATT (No), Intel (No) | No further discussion is suggested as R16 can work without it |

For issue A (minimumSchedulingOffset 🡪 minimumSchedulingOffsetK0/K2), the following is suggested:

Proposal 2: Specify minimumSchedulingOffset to minimumSchedulingOffsetK0 and/or minimumSchedulingOffsetK2 in Section 7.3.1 of TS 38.212 and Section 5.2.1.5.1 in TS 38.214. Discuss and decide the following TPs.

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| 7.3.1.2.2 Format 1\_1<omitted text>- Minimum applicable scheduling offset indicator – 0 or 1 bit - 0 bit if higher layer parameter *minimumSchedulingOffsetK0 and minimumSchedulingOffsetK2* are not configured;- 1 bit if higher layer parameter *minimumSchedulingOffset K0 or minimumSchedulingOffsetK2* is configured. The 1 bit indication is used to determine the minimum applicable K0 for the active DL BWP and the minimum applicable K2 value for the active UL BWP according to Table 7.3.1.1.2-33. If the minimum applicable K0 is indicated, the minimum applicable value of the aperiodic CSI-RS triggering offset for an active DL BWP shall be the same as the minimum applicable K0 value. <omitted text> |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 7.3.1.1.2 Format 0\_1<omitted text>- Minimum applicable scheduling offset indicator – 0 or 1 bit - 0 bit if higher layer parameter *minimumSchedulingOffsetK0 and minimumSchedulingOffsetK2* are not configured;- 1 bit if higher layer parameter *minimumSchedulingOffsetK0 or minimumSchedulingOffsetK2* is configured. The 1 bit indication is used to determine the minimum applicable K0 for the active DL BWP and the minimum applicable K2 value for the active UL BWP according to Table 7.3.1.1.2-33. If the minimum applicable K0 is indicated, the minimum applicable value of the aperiodic CSI-RS triggering offset for an active DL BWP shall be the same as the minimum applicable K0 value. <omitted text>**Table 7.3.1.1.2-33: Joint indication of minimum applicable scheduling offset K0/K2**

|  |  |  |
| --- | --- | --- |
| **Bit field mapped to index** | **Minimum applicable K0 for the active DL BWP, if *minimumSchedulingOffsetK0* is configured for the DL BWP** | **Minimum applicable K2 for the active UL BWP, if *minimumSchedulingOffsetK2* is configured for the UL BWP** |
| 0 | The first value configured by *minimumSchedulingOffsetK0* for the active DL BWP if the first value is configured; 0 otherwise | The first value configured by *minimumSchedulingOffsetK2* for the active UL BWP if the first value is configured; 0 otherwise |
| 1 | The second value configured by *minimumSchedulingOffsetK0* for the active DL BWP if the second value is configured; 0 otherwise | The second value configured by *minimumSchedulingOffsetK2* for the active UL BWP if the second value is configured; 0 otherwise |

<omitted text> |

|  |
| --- |
| 5.2.1.5.1 Aperiodic CSI Reporting/Aperiodic CSI-RS when the triggering PDCCH and the CSI-RS have the same numerology<omitted text>When aperiodic CSI-RS is used with aperiodic reporting, the CSI-RS offset is configured per resource set by the higher layer parameter *aperiodicTriggeringOffset*, including the case that the UE is not configured with *minimumSchedulingOffsetK0* for any DL BWP or *minimumSchedulingOffsetK2* for any UL BWP and all the associated trigger states do not have the higher layer parameter *qcl-Type* set to 'QCL-TypeD' in the corresponding TCI states. The CSI-RS triggering offset has the values of {0, 1, 2, 3, 4, 5, 6, …, 15, 16, 24} slots. If the UE is not configured with *minimumSchedulingOffsetK0* for any DL BWP or *minimumSchedulingOffsetK2* for any UL BWP and if all the associated trigger states do not have the higher layer parameter *qcl-Type* set to 'QCL-TypeD' in the corresponding TCI states , the CSI-RS triggering offset is fixed to zero. The aperiodic triggering offset of the CSI-IM follows offset of the associated NZP CSI-RS for channel measurement.<omitted text> |

For issue B (clarification for application delay), the following proposal is suggested:

Proposal 3: For clarification on application delay, discuss and decide the following TP.

|  |
| --- |
| 5.3.1 Application delay of the minimum scheduling offset restriction<omitted text>When the DCI format 0\_1 or 1\_1 with ~~[~~‘Minimum applicable scheduling offset indicator’~~]~~ field indicating a change to the applied *K*0min or *K*2min is contained within the first three symbols of the slot, the value of application delay *X* is determined by, where *K*0minOld ~~is~~ and are the currently applied *K*0min value and the numerology of the active DL BWP in the scheduled cell, respectively, and is the numerology of the active DL BWP of the scheduling cell, and *Zµ* is determined by the subcarrier spacing of the active DL BWP in the scheduling cell, and given in Table 5.3.1-1 ~~and~~ *~~µ~~*~~PDCCH~~ ~~and~~ *~~µ~~*~~PDSCH~~ ~~are the sub-carrier spacing configurations for PDCCH and PDSCH, respectively~~. If *K*0min value is not configured for the active DL BWP in the scheduled cell, *K*0minOld is assumed to take the value zero. When the DCI format 0\_1 or 1\_1 with ~~[~~‘Minimum applicable scheduling offset indicator’~~]~~ field is received outside the first ~~[~~three~~]~~ symbols of the slot, value of *Zµ* from Table 5.3.1-1 is incremented by one before determining the application delay *X* by using the formula of DCI within the first three symbols of the slot.<omitted text> |

For issue C (confirm working assumptions), the following proposal is suggested:

Proposal 4: Confirm the following working assumptions for Rel-16:

|  |
| --- |
| Agreements (RAN1 #99):For PDCCH monitoring case 1-1 for Cross-carrier scheduling, the application delay of cross-slot scheduling adaptation, denoted by X slot(s) for the scheduling cell, is determined by* X = max(Y, Z)
* Z is determined by the SCS of the active DL BWP of the scheduling cell and takes value of 1/1/2/2 slot(s) for DL SCS of 15/30/60/120 KHz, respectively
* Y is determined as one of the following alternatives:
* (working assumption) ceiling(minK0,scheduled\*2^scheudling/2^scheudled), where minK0,scheduled the minimum applicable K0 value of the active DL BWP of the scheduled cell prior to the change indication for the scheduled cell, scheudling and scheudled are the SCS indices for the scheduling cell and the scheduled cell, respectively.
 |
| Agreement (RAN1 #100b-e):For DCI scheduling PDSCH or PUSCH and indicating active BWP change,* (Working assumption) K0/K2 is no smaller than max(K0min/K2min of source BWP, BWP switch delay)
	+ Numerology conversion is applied to K0min/K2min in case of numerology change between target BWP and source BWP.
* The indicated K0min/K2min of target BWP is always applied starting from the slot of PDSCH or PUSCH scheduled by the DCI
* Clarify the application timing of a K0min/K2min change indicated by a cross-carrier scheduling that is before the DCI indicating active BWP change to a target BWP of different numerology in the scheduling cell.
 |
| Agreements (RAN1 #100b-e):* The minimum scheduling offset restriction is not applied when PDSCH transmission is scheduled with MsgB-RNTI.
* (Working assumption) The minimum scheduling offset restriction is not applied when PDSCH transmission is scheduled with C-RNTI or MCS-C-RNTI in the search space set provided by recoverySearchSpaceId when monitoring PDCCH as described in Section 6 [38.213].
 |

Finally, for issue D (clarification of UE assistance info), the following proposal is suggested:

Proposal 5: UE suggested values for *minimumSchedulingOffsetK0* and *minimumSchedulingOffsetK2* can also be applied to cross-carrier scheduling case.

* **Note: No change to current RAN2 description in TS 38.331**

Table 3: Companies’ views on other remaining issues

|  |  |
| --- | --- |
| Company | View(s)/Suggested TP |
| VIVO | **Proposal 1: Confirm the following working assumption*** **(Working assumption) K0/K2 is no smaller than max(K0min/K2min of source BWP, BWP switch delay)**
	+ **Numerology conversion is applied to K0min/K2min in case of numerology change between target BWP and source BWP.**

Proposal 3: Upon detecting PDCCH WUS indicating UE to wake up in the upcoming DRX OnDuration, UE automatically switch to same-slot scheduling in the upcoming DRX OnDuration. This mechanism can be switched on/off by network.Proposal 4: If PDCCH WUS for CDRX is not configured, upon UE receives new transmission in DRX OnDuration, UE automatically switch to same-slot scheduling. This mechanism can be switched on/off by network. |
| ZTE | **Proposal 3: Adopt the following Text proposal:**------------------------------- Text Proposal for 38.214 clause 5.3.1----------------------------------When the DCI format 0\_1 or 1\_1 with [‘Minimum applicable scheduling offset indicator’**]** field indicating a change to the applied *K*0min or *K*2min is contained within the first three symbols of the slot, the value of application delay *X* is determined by,  where *K*0minOld is the currently applied *K*0min value of the active DL BWP in the scheduled cell, and *Zµ* is determined by the subcarrier spacing of the active DL BWP in the scheduling cell, and given in Table 5.3.1-1 and *µ*PDCCH and *µ*Scheduled\_DLBWP are the sub-carrier spacing configurations for PDCCH and active DL BWP in scheduled cell when the DCI is received in slot n, respectively ------------------------------ Text Proposal for 38.214 clause 5.3.1----------------------------------- |
| HW, HiSilicon | ***Proposal 1: Confirm the working assumption:*** ***For DCI scheduling PDSCH or PUSCH and indicating active BWP change,**** ***K0/K2 is no smaller than max(K0min/K2min of source BWP, BWP switch delay)***
	+ ***Numerology conversion is applied to K0min/K2min in case of numerology change between target BWP and source BWP.***

***Proposal 3: Adopt one of the following options and endorse the corresponding TP:**** ***Option 1 (TP2): The minimumSchedulingOffsetK0 and minimumSchedulingOffsetK2 are required to be configured for any pair of active DL BWP and active UL BWP of a Cell, if configured.***
* ***Option 2 (TP3): It is allowed that only one of the active BWPs of a cell is configured with minimumSchedulingoffsetK0/minimumSchedulingoffsetK2, in which cases the UE utilizes the applicable K0min and K2min in the following table:***

|  |  |  |  |
| --- | --- | --- | --- |
| ***minimumSchedulingOffsetK0* for the active DL BWP** | ***minimumSchedulingOffsetK2* for active UL BWP** | **Minimum applicable K0 on the active DL BWP** | **Minimum applicable K2 on the active UL BWP** |
| ***Not configured*** | ***Configured*** | *K0min = 0;* | *K2min = 0;* |
| ***Configured*** | ***Not configured*** | *K0min = the indicated minimumSchedulingOffsetK0;*  | *K2min = 0;* |

---------------------------------- Start of Text Proposal 2 for Option 1--------------------------------------7.3.1.1.2 Format 0\_1< Unchanged parts are omitted >- Minimum applicable scheduling offset indicator – 0 or 1 bit - 0 bit if higher layer parameter *minimumSchedulingOffsetK0 and minimumSchedulingOffsetK2* are not configured;- 1 bit if higher layer parameter *minimumSchedulingOffsetK0 and minimumSchedulingOffsetK2* are both configured. The 1 bit indication is used to determine the minimum applicable K0 for the active DL BWP and the minimum applicable K2 value for the active UL BWP according to Table 7.3.1.1.2-33. If the minimum applicable K0 is indicated, the minimum applicable value of the aperiodic CSI-RS triggering offset for an active DL BWP shall be the same as the minimum applicable K0 value. < Unchanged parts are omitted >7.3.1.2.2 Format 1\_1< Unchanged parts are omitted >- Minimum applicable scheduling offset indicator – 0 or 1 bit - 0 bit if higher layer parameter *minimumSchedulingOffsetK0 and minimumSchedulingOffsetK2* are not configured;- 1 bit if higher layer parameter *minimumSchedulingOffsetK0 and minimumSchedulingOffsetK2* are both configured. The 1 bit indication is used to determine the minimum applicable K0 for the active DL BWP and the minimum applicable K2 value for the active UL BWP according to Table 7.3.1.1.2-33. If the minimum applicable K0 is indicated, the minimum applicable value of the aperiodic CSI-RS triggering offset for an active DL BWP shall be the same as the minimum applicable K0 value. < Unchanged parts are omitted >---------------------------------- End of Text Proposal 2 for Option 1----------------------------------------------------------------------- Start of Text Proposal 3 for Option 2--------------------------------------< Unchanged parts are omitted >7.3.1.1.2 Format 0\_1< Unchanged parts are omitted >- Minimum applicable scheduling offset indicator – 0 or 1 bit - 0 bit if higher layer parameter *minimumSchedulingOffsetK0 and minimumSchedulingOffsetK2* are not configured;- 1 bit if higher layer parameter *minimumSchedulingOffsetK0 or minimumSchedulingOffsetK2* is configured. The 1 bit indication is used to determine the minimum applicable K0 for the active DL BWP and the minimum applicable K2 value for the active UL BWP according to Table 7.3.1.1.2-33 if *minimumSchedulingoffsetK2* for the active UL BWP and *minimumSchedulingoffsetK0* for the active DL BWP are both configured. If the minimum applicable K0 is indicated, the minimum applicable value of the aperiodic CSI-RS triggering offset for an active DL BWP shall be the same as the minimum applicable K0 value. If *minimumSchedulingoffsetK0* for the active DL BWP is configured and *minimumSchedulingoffsetK2* for the active UL BWP is not configured, the minimum applicable K0 for the active DL BWP is indicated by the 1 bit indication according to Table 7.3.1.1.2-33 and the minimum applicable K2 value for the active UL BWP is set to zero.If *minimumSchedulingoffsetK2* for the active UL BWP is configured and *minimumSchedulingoffsetK0* for the active DL BWP is not configured, both the minimum applicable K0 for the active DL BWP and the minimum applicable K2 value for the active UL BWP are set to zero.< Unchanged parts are omitted >7.3.1.2.2 Format 1\_1< Unchanged parts are omitted >- Minimum applicable scheduling offset indicator – 0 or 1 bit - 0 bit if higher layer parameter *minimumSchedulingOffsetK0 and minimumSchedulingOffsetK2* are not configured;- 1 bit if higher layer parameter either *minimumSchedulingOffsetK0 or minimumSchedulingOffsetK2* is configured. The 1 bit indication is used to determine the minimum applicable K0 for the active DL BWP and the minimum applicable K2 value for the active UL BWP according to Table 7.3.1.1.2-33. If the minimum applicable K0 is indicated, the minimum applicable value of the aperiodic CSI-RS triggering offset for an active DL BWP shall be the same as the minimum applicable K0 value. If *minimumSchedulingoffsetK0* for the active DL BWP is configured and *minimumSchedulingoffsetK2* for the active UL BWP is not configured, the minimum applicable K0 for the active DL BWP is indicated by the 1 bit indication according to Table 7.3.1.1.2-33 and the minimum applicable K2 value for the active UL BWP is set to zero.If *minimumSchedulingoffsetK2* for the active UL BWP is configured and *minimumSchedulingoffsetK0* for the active DL BWP is not configured, both the minimum applicable K0 for the active DL BWP and the minimum applicable K2 value for the active UL BWP are set to zero.< Unchanged parts are omitted >---------------------------------- End of Text Proposal 3 for Option 2--------------------------------------***Proposal 4: Adopt Text Proposal 4 to change the subscript of µPDSCH and modify the related description accordingly.***------------------------------------------ Start of Text Proposal 4---------------------------------------------< Unchanged parts are omitted >5.3.1 Application delay of the minimum scheduling offset restriction< Unchanged parts are omitted >When the DCI format 0\_1 or 1\_1 with ‘Minimum applicable scheduling offset indicator’field indicating a change to the applied *K*0min or *K*2min is contained within the first three symbols of the slot, the value of application delay *X* is determined by, where *K*0minOld is the currently applied *K*0min value of the active DL BWP in the scheduled cell, *Zµ* is determined by the subcarrier spacing of the active DL BWP in the scheduling cell, and given in Table 5.3.1-1, *µ*PDCCH is the sub-carrier spacing configuration for PDCCH and *µ*active DL BWPis the sub-carrier spacing configuration for the active DL BWP in the scheduled cell.< Unchanged parts are omitted >-------------------------------------------- End of Text Proposal 4--------------------------------------------***Proposal 5: For timer or RRC signaling based BWP switching, the applicable K0min/K2min on the new BWP is applied immediately from the slot where the UE can receive or transmit as defined by the BWP switching delay, and adopt TP5.***------------------------------------------ Start of Text Proposal 5---------------------------------------------< Unchanged parts are omitted >5.3.1 Application delay of the minimum scheduling offset restrictionWhen the UE is scheduled with DCI format 0\_1 or 1\_1 with a ‘Minimum applicable scheduling offset indicator’field in slot *n*, it shall determine the *K*0min and *K*2min values to be applied, while the previously applied *K*0min and *K*2min values are applied until the new values take effect. If the DCI in slot *n* also indicates an active DL (UL) BWP change for a serving cell, the indicated *K*0min (*K*2min) value in the new active DL (UL) BWP, if configured, is applied from the slot indicated by the slot offset value of the time domain resource assignment field in the DCI. Otherwise, change of applied minimum scheduling offset restriction indication carried by DCI in slot *n*, shall be applied in slot *n*+*X* of the scheduling cell. The UE does not expect to be scheduled with DCI format 0\_1 or 1\_1 with ‘Minimum applicable scheduling offset indicator’ field indicating another change to the applied *K*0min and *K*2min for the same active BWP before slot *n+X* of the scheduling cell.When the DCI format 0\_1 or 1\_1 with [‘Minimum applicable scheduling offset indicator’**]** field indicating a change to the applied *K*0min or *K*2min is contained within the first three symbols of the slot, the value of application delay *X* is determined by, where *K*0minOld is the currently applied *K*0min value of the active DL BWP in the scheduled cell, and *Zµ* is determined by the subcarrier spacing of the active DL BWP in the scheduling cell, and given in Table 5.3.1-1 and *µ*PDCCH and *µ*PDSCH are the sub-carrier spacing configurations for PDCCH and PDSCH, respectivelyWhen the UE changes an active DL BWP due to a BWP inactivity timer expiration, the *K*0min value in the new active DL BWP is applied from the slot where the UE can receive or transmit as defined by the BWP switching delay [11, TS 38.133]. When the UE changes an active DL (UL) BWP due to RRC signalling, the *K*0min (*K*2min) value in the new active DL (UL) BWP is applied from the slot where the UE can receive or transmit as defined by the BWP switching delay [11, TS 38.133].< Unchanged parts are omitted >-------------------------------------------- End of Text Proposal 5-------------------------------------------- |
| CATT | **Clarification on minimumSchedulingOffset in 38.212 by specifying DL/UL BWP for DCI format 1\_1/0\_1*****Proposal 3: The minimumSchedulingOffset includes ‘minimumSchedulingOffsetK0-r16’* and *‘minimumSchedulingOffsetK2-r16’.******Proposal 4: DCI format 0-2/1-2 does not support the1-bit indication of cross-slot scheduling.*** |
| MTK | Proposal 3: To extend UE assistance information for cross-carrier scheduling case, the range for 60 kHz or 120 kHz SCS is revised as {2, 4, 8, ~~12~~16} slots.* **Send LS to RAN2 to inform the range change**
* **Note: gNodeB can apply UE suggested K0min and K2min values to both same-carrier scheduling and cross-carrier scheduling cases.**

Proposal 4: For Rel-16 cross-slot scheduling adaptation, the following working assumptions are confirmed:

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| --- |
| Agreements (RAN1 #99):For PDCCH monitoring case 1-1 for Cross-carrier scheduling, the application delay of cross-slot scheduling adaptation, denoted by X slot(s) for the scheduling cell, is determined by* X = max(Y, Z)
* Z is determined by the SCS of the active DL BWP of the scheduling cell and takes value of 1/1/2/2 slot(s) for DL SCS of 15/30/60/120 KHz, respectively
* Y is determined as one of the following alternatives:
* (working assumption) ceiling(minK0,scheduled\*2^scheudling/2^scheudled), where minK0,scheduled the minimum applicable K0 value of the active DL BWP of the scheduled cell prior to the change indication for the scheduled cell, scheudling and scheudled are the SCS indices for the scheduling cell and the scheduled cell, respectively.
 |
| Agreement (RAN1 #100b-e):For DCI scheduling PDSCH or PUSCH and indicating active BWP change,* (Working assumption) K0/K2 is no smaller than max(K0min/K2min of source BWP, BWP switch delay)
	+ Numerology conversion is applied to K0min/K2min in case of numerology change between target BWP and source BWP.
* The indicated K0min/K2min of target BWP is always applied starting from the slot of PDSCH or PUSCH scheduled by the DCI
* Clarify the application timing of a K0min/K2min change indicated by a cross-carrier scheduling that is before the DCI indicating active BWP change to a target BWP of different numerology in the scheduling cell.
 |
| Agreements (RAN1 #100b-e):* The minimum scheduling offset restriction is not applied when PDSCH transmission is scheduled with MsgB-RNTI.
* (Working assumption) The minimum scheduling offset restriction is not applied when PDSCH transmission is scheduled with C-RNTI or MCS-C-RNTI in the search space set provided by recoverySearchSpacdId when monitoring PDCCH as described in Section 6 [38.213].
 |

Proposal 5: Consider the following TPs for clarification purpose:* ***minimumSchedulingOffset* is specified as *minimumSchedulingOffsetK0 or minimumSchedulingOffsetK2* in Section 5.2.1.5.1 of TS 38.214**
	+ **We have made the change in Sections 5.1.2.1 and 6.1.2.1, it is consistent to make the change to Section 5.2.1.5.1 to avoid confusion.**

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| --- |
| 5.2.1.5.1 Aperiodic CSI Reporting/Aperiodic CSI-RS when the triggering PDCCH and the CSI-RS have the same numerology<omitted text>When aperiodic CSI-RS is used with aperiodic reporting, the CSI-RS offset is configured per resource set by the higher layer parameter *aperiodicTriggeringOffset*, including the case that the UE is not configured with *minimumSchedulingOffsetK0* for any DL BWP or *minimumSchedulingOffsetK2* for any UL BWP and all the associated trigger states do not have the higher layer parameter *qcl-Type* set to 'QCL-TypeD' in the corresponding TCI states. The CSI-RS triggering offset has the values of {0, 1, 2, 3, 4, 5, 6, …, 15, 16, 24} slots. If the UE is not configured with *minimumSchedulingOffsetK0* for any DL BWP or *minimumSchedulingOffsetK2* for any UL BWP and if all the associated trigger states do not have the higher layer parameter *qcl-Type* set to 'QCL-TypeD' in the corresponding TCI states , the CSI-RS triggering offset is fixed to zero. The aperiodic triggering offset of the CSI-IM follows offset of the associated NZP CSI-RS for channel measurement.<omitted text> |

* **Clarification for the case no minimum scheduling offset restriction is configured in Section 5.3.1 of TS 38.214:**

|  |
| --- |
| 5.3.1 Application delay of the minimum scheduling offset restriction<omitted text>When the DCI format 0\_1 or 1\_1 with [‘Minimum applicable scheduling offset indicator’**]** field indicating a change to the applied *K*0min or *K*2min is contained within the first three symbols of the slot, the value of application delay *X* is determined by, where *K*0minOld is the currently applied *K*0min value of the active DL BWP in the scheduled cell, if configured, and is set to zero otherwise, and *Zµ* is determined by the subcarrier spacing of the active DL BWP in the scheduling cell, and given in Table 5.3.1-1 and *µ*PDCCH and *µ*PDSCH are the sub-carrier spacing configurations for PDCCH and PDSCH, respectively <omitted text> |

Proposal 6: Removal of square bracket in Section 5.3.1 as follows:

|  |
| --- |
| 5.3.1 Application delay of the minimum scheduling offset restriction<omitted text>When the DCI format 0\_1 or 1\_1 with ~~[~~‘Minimum applicable scheduling offset indicator’**~~]~~** field indicating a change to the applied *K*0min or *K*2min is contained within the first three symbols of the slot, the value of application delay *X* is determined by, where  *K*0minOld is the currently applied *K*0min value of the active DL BWP in the scheduled cell, and *Zµ* is determined by the subcarrier spacing of the active DL BWP in the scheduling cell, and given in Table 5.3.1-1 and *µ*PDCCH and *µ*PDSCH are the sub-carrier spacing configurations for PDCCH and PDSCH, respectively When the DCI format 0\_1 or 1\_1 with ~~[~~‘Minimum applicable scheduling offset indicator’**~~]~~** field is received outside the first ~~[~~three~~]~~ symbols of the slot, value of *Zµ* from Table 5.3.1-1 is incremented by one before determining the application delay *X*.<omitted text> |

 |
| Intel | **Proposal 3: DCI format 0\_2/1\_2 does not include ['Minimum applicable scheduling offset indicator'] field.**  |
| Samsung | ***Proposal 1: If UE receives a DCI format scheduling PDSCH/PUSCH to a target BWP and all TDRA entries of the target BWP are invalid after applying K0min/K2min, the UE assumes that scheduling offset of the PDSCH/PUSCH is equal to current K0min/K2min value.******Proposal 3: The minimum scheduling offset restriction is not applied when default PDSCH time domain resource allocation is used.***There is a case where a UE monitors C/MCS-C/CS-RNTI with SI/P/RA-RNTI simultaneously described. In this case, since a UE does not know whether the DCI format is for C/MCS-C/CS-RNTI or SI/RA/P-RNTI before finishing decoding, it is not possible for the UE to apply PDCCH processing time relaxation only for C/MCS-C/CS-RNTI. Therefore, the minimum applicable scheduling offset should not be applied for above case.***Proposal 4: The adaptation on the minimum applicable value does not apply to C/MCS-C/CS-RNTI when the UE monitors PDCCH candidates corresponding to C-RNTI, MCS-C-RNTI, or CS-RNTI in the one or more search space sets in a slot where the UE monitors PDCCH candidates for at least a DCI format 0\_0 or a DCI format 1\_0 with CRC scrambled by SI-RNTI, RA-RNTI or P-RNTI.*****Proposed TP for TS 38.214 [2]**

|  |
| --- |
| 5.1.2.1 Resource allocation in time domain================================ Unchanged part is omitted =================================When the UE configured with *minimumSchedulingOffsetK0* in an active DL BWP it applies a minimum scheduling offset restriction indicated by the ‘Minimum applicable scheduling offset indicator’field in DCI format 0\_1 or 1\_1. When the UE is configured with *minimumSchedulingOffsetK0* in an active DL BWP and it has not received ‘Minimum applicable scheduling offset indicator’ field in DCI format 0\_1 or 1\_1, the UE shall apply a minimum scheduling offset restriction indicated based on ‘Minimum applicable scheduling offset indicator’ value ‘0’. When the minimum scheduling offset restriction is applied the UE is not expected to be scheduled with a DCI in slot *n* to receive a PDSCH scheduled with C-RNTI, CS-RNTI or MCS-C-RNTI with *K*0 smaller than, where *K*0minand are the applied minimum scheduling offset restriction and the numerology of the active DL BWP of the scheduled cell when receiving the DCI in slot *n,* respectively, and is the numerology of the new active DL BWP in case of active DL BWP change in the scheduled cell and is equal to , otherwise. The minimum scheduling offset restriction is not applied when ~~PDSCH transmission is scheduled with C-RNTI, CS-RNTI or MCS-C-RNTI in common search space associated with CORESET0 and~~ default PDSCH time domain resource allocation is used, in the search space set provided by *recoverySearchSpaceId* when monitoring PDCCH as described in [6, TS 38.213] or when PDSCH transmission is scheduled with SI-RNTI, MsgB-RNTI or RA-RNTI or when the UE monitors PDCCH candidates for the C-RNTI, CS-RNTI, or MCS-C-RNTI in the one or more search space sets where the UE monitors PDCCH candidates for at least a DCI format 0\_0 or a DCI format 1\_0 with CRC scrambled by SI-RNTI, RA-RNTI or P-RNTI [6, TS 38.213]. The application delay of the change of the minimum scheduling offset restriction is determined in Section 5.3.1. |

 |
| CMCC | **Proposal 3. Confirm the working assumption:*** **The minimum scheduling offset restriction is not applied when PDSCH transmission is scheduled with C-RNTI or MCS-C-RNTI in the search space set provided by recoverySearchSpaceId when monitoring PDCCH as described in Section 6 [38.213].**
 |
| Spreadtrum | ***Proposal 2: Add a note under the table 7.3.1.1.2-33: The number of candidate value of minimum applicable K0 and K2 are the same, if configured.******Proposal 3: Change the parameter minimumSchedulingOffset in physical specification into minimumSchedulingOffsetK0 and minimumSchedulingOffsetK2 accordingly.******Proposal 4: consider to adopt TP in appendix 5.1.*** |
| LG | **Proposal 2: The adaptation on the minimum applicable value of K0 does not apply to C-/CS-/MCS-C-RNTI monitored in any search space set associated with any CORESET if default TDRA table is applied.** |
| OPPO | Cross-slot indication bitThe corresponding TP1 is proposed:--------------------- Text Proposal to 38.212: ----------------------7.3.1.1.2 Format 0\_1<Unchanged parts are omitted>- Minimum applicable scheduling offset indicator – 0 or 1 bit - 0 bit if higher layer parameter *~~minimumSchedulingOffset~~ minimumSchedulingOffsetK0* and *minimumSchedulingOffsetK2* are ~~is~~ not configured;- 1 bit if higher layer parameter *~~minimumSchedulingOffset~~ minimumSchedulingOffsetK0* or *minimumSchedulingOffsetK2* is configured. The 1 bit indication is used to determine the minimum applicable K0 for the active DL BWP and the minimum applicable K2 value for the active UL BWP according to Table 7.3.1.1.2-33. If the minimum applicable K0 is indicated, the minimum applicable value of the aperiodic CSI-RS triggering offset for an active DL BWP shall be the same as the minimum applicable K0 value. - SCell dormancy indication – 0 bit if higher layer parameter *Scell-groups-for-dormancy-within-active-time* is not configured; otherwise 1, 2, 3, 4 or 5 bits bitmap determined according to higher layer parameter *Scell-groups-for-dormancy-within-active-time,* where each bit corresponds to one of the SCell group(s) configured by higher layers parameter *Scell-groups-for-dormancy-within-active-time,* with MSB to LSB of the bitmap corresponding to the first to last configured SCell group. The field is only present when this format is carried by PDCCH on the primary cell within DRX Active Time and the UE is configured with at least two DL BWPs for an SCell.<Unchanged parts are omitted>**Table 7.3.1.1.2-33: Joint indication of minimum applicable scheduling offset K0/K2**

|  |  |  |
| --- | --- | --- |
| **Bit field mapped to index** | **Minimum applicable K0 for the active DL BWP, if *minimumSchedulingOffsetK0* is configured for the DL BWP** | **Minimum applicable K2 for the active UL BWP, if *minimumSchedulingOffsetK2* is configured for the UL BWP** |
| 0 | The first value configured by *minimumSchedulingOffsetK0* for the active DL BWP if the first value is configured; 0 otherwise | The first value configured by *minimumSchedulingOffsetK2* for the active UL BWP if the first value is configured; 0 otherwise |
| 1 | The second value configured by *minimumSchedulingOffsetK0* for the active DL BWP if the second value is configured; 0 otherwise | The second value configured by *minimumSchedulingOffsetK2* for the active UL BWP if the second value is configured; 0 otherwise |

<Unchanged parts are omitted>**Applicability of the Minimum k**As summary, we propose to exclude all DCI by RNTI applied with a default PDSCH TDRA table from the application range of minimum k0.**Application delay time**The solve the unclear description TP2 is given:--------------------- Text Proposal to 38.214: ----------------------* 5.3.1 Application delay of the minimum scheduling offset restriction

<Unchanged parts are omitted>When the DCI format 0\_1 or 1\_1 with ~~[~~‘Minimum applicable scheduling offset indicator’**~~]~~** field indicating a change to the applied *K*0min or *K*2min is contained within the first three symbols of the slot, the value of application delay *X* is determined by, where *K*0minOld is the currently applied *K*0min value of the active DL BWP in the scheduled cell, and *Zµ* is determined by the subcarrier spacing of the active DL BWP in the scheduling cell, and given in Table 5.3.1-1 and *µ*PDCCH and *µ*PDSCH are the sub-carrier spacing configurations for PDCCH and PDSCH, respectively When the DCI format 0\_1 or 1\_1 with ~~[~~‘Minimum applicable scheduling offset indicator’**~~]~~** field is received outside the first [three] symbols of the slot, value of *Zµ* from Table 5.3.1-1 is incremented by one before determining the application delay *X* by using the formula of DCI within the first three symbols of the slot.**Table 5.3.1-1: Definition of *Zµ***

|  |  |
| --- | --- |
| ***µ*** | ***Zµ*** |
| 0 | 1 |
| 1 | 1 |
| 2 | 2 |
| 3 | 2 |

<Unchanged parts are omitted> |
| Ericsson | Proposal 1: Adopt TP1 for 7.3.1.1.2 and 7.3.1.2.2, TS 38.212.<begin TP1>7.3.1.1.2 Format 0\_1<omitted text>Minimum applicable scheduling offset indicator – 0 or 1 bit - 0 bit if higher layer parameter *~~minimumSchedulingOffset~~* *minimumSchedulingOffsetK2* is not configured;- 1 bit if higher layer parameter *~~minimumSchedulingOffset~~* *minimumSchedulingOffsetK2* is configured. The 1 bit indication is used to determine the minimum applicable K0 for the active DL BWP and the minimum applicable K2 value for the active UL BWP according to Table 7.3.1.1.2-33. If the minimum applicable K0 is indicated, the minimum applicable value of the aperiodic CSI-RS triggering offset for an active DL BWP shall be the same as the minimum applicable K0 value.<omitted text>7.3.1.2.2 Format 1\_1<omitted text>Minimum applicable scheduling offset indicator – 0 or 1 bit - 0 bit if higher layer parameter *~~minimumSchedulingOffset~~* *minimumSchedulingOffsetK0* is not configured;- 1 bit if higher layer parameter *~~minimumSchedulingOffset~~* *minimumSchedulingOffsetK0* is configured. The 1 bit indication is used to determine the minimum applicable K0 for the active DL BWP and the minimum applicable K2 value for the active UL BWP according to Table 7.3.1.1.2-33. If the minimum applicable K0 is indicated, the minimum applicable value of the aperiodic CSI-RS triggering offset for an active DL BWP shall be the same as the minimum applicable K0 value.<omitted text><end TP1>**Observation : For the case of cross-carrier scheduling, the UE suggested K0min/K2min value represents the suggested value for the scheduled carrier based on the scheduled carrier SCS.** |
| NTT DOCOMO | **Proposal 1: Confirm following Working assumption:*** + **For DCI scheduling PDSCH or PUSCH and indicating active BWP change,**
		- **(Working assumption) K0/K2 is no smaller than max(K0min/K2min of source BWP, BWP switch delay)**
			* **Numerology conversion is applied to K0min/K2min in case of numerology change between target BWP and source BWP.**
 |
| Qualcomm | Proposal 1: For application delay determination, if is not configured for the currently active DL BWP, is assumed in the expression for application delay determination.Proposal 2: As a rule for deriving a suggested minimum scheduling offset value for cross-carrier scheduling, adding a fixed offset to the suggested value for same-carrier scheduling can be considered.Given that the UE suggested values will be captured in RAN2 specification instead of RAN1, we prefer the discussion for cross-carrier scheduling case to take place in RAN2. Therefore, no TP is presented as this proposal should be discussed and specified in RAN2.Proposal 3: Confirm the working assumption in RAN1 #99 and apply numerology conversion to the application delay based on the numerologies of the scheduling and scheduled cells.============TP for TS 38.214 Section 5.3.1======================================--Unchanged part omitted------------------------When the DCI format 0\_1 or 1\_1 with [‘Minimum applicable scheduling offset indicator’**]** field indicating a change to the applied *K*0min or *K*2min is contained within the first three symbols of the slot, the value of application delay *X* is determined by, where *K*0minOld ~~is~~ and are the currently applied *K*0min value and the numerology of the active DL BWP in the scheduled cell, respectively, and is the numerology of the active DL BWP of the scheduling cell, and *Zµ* is determined by the subcarrier spacing of the active DL BWP in the scheduling cell, and given in Table 5.3.1-1 ~~and~~ *~~µ~~*~~PDCCH~~ ~~and~~ *~~µ~~*~~PDSCH~~ ~~are the sub-carrier spacing configurations for PDCCH and PDSCH, respectively~~. If *K*0min value is not configured for the active DL BWP in the scheduled cell, *K*0minOld is assumed to take the value zero. When the DCI format 0\_1 or 1\_1 with [‘Minimum applicable scheduling offset indicator’**]** field is received outside the first [three] symbols of the slot, value of *Zµ* from Table 5.3.1-1 is incremented by one before determining the application delay *X*.Table 5.3.1-1: Definition of *Zµ*

|  |  |
| --- | --- |
| *µ* | *Zµ* |
| 0 | 1 |
| 1 | 1 |
| 2 | 2 |
| 3 | 2 |

--Unchanged part omitted------------------------======================================================================== |
| Nokia | ***Proposal 1:*** *Confirm following working assumptions:** *Confirm that in case of DCI triggered BWP change the scheduling slot offset cannot be smaller than maximum of scheduling offset and BWP switch delay*
	+ (Working assumption) K0/K2 is no smaller than max(K0min/K2min of source BWP, BWP switch delay)
		- Numerology conversion is applied to K0min/K2min in case of numerology change between target BWP and source BWP.
* *Confirm that the minimum offset restriction is not applied when UE monitors PDCCH for BFR:*
	+ The minimum scheduling offset restriction is not applied when PDSCH transmission is scheduled with C-RNTI or MCS-C-RNTI in the search space set provided by recoverySearchSpace~~d~~Id when monitoring PDCCH as described in Section 6 [38.213]
* *Confirm the determination of value Y for cross-carrier scheduling as follows:*
	+ ceiling(minK0,scheduled\*2^scheudling/2^scheudled), where minK0,scheduled the minimum applicable K0 value of the active DL BWP of the scheduled cell prior to the change indication for the scheduled cell, scheudling and scheudled are the SCS indices for the scheduling cell and the scheduled cell, respectively.

***Proposal 3:*** Support applying minimum scheduling offset restriction of *K2* to A-SRS so that UE can expect that DCI would not trigger transmission of A-SRS resource(s) with *slotOffset*<K2min.***Proposal 5:*** *Support cross-slot scheduling also for the new Rel-16 DCI formats 0\_2 and 1\_2* ***Proposal 9:*** *Same single suggested value is applicable both in case of cross-carrier scheduling as well as in same-carrier scheduling.* |
|  |  |

# Summary for Preparation Phase

In this summary, companies’ views are summarized, and the remaining issues and their solutions are identified. In particular, the following are suggested for further email discussion:

**Proposal 1: To clarify the timing related information in Section 5.3.1 of TS 38.214, discuss and decide the following TP.**

|  |
| --- |
| 5.3.1 Application delay of the minimum scheduling offset restriction<omitted text>When the UE is scheduled with DCI format 0\_1 or 1\_1 with a ‘Minimum applicable scheduling offset indicator’field in slot *n*, it shall determine the *K*0min and *K*2min values to be applied, while the previously applied *K*0min and *K*2min values are applied until the new values take effect. If the DCI in slot *n* also indicates an active DL (UL) BWP change for a serving cell, the indicated *K*0min (*K*2min) value in the new active DL (UL) BWP, if configured, is applied from the slot indicated by the slot offset value of the time domain resource assignment field in the DCI. Otherwise, change of applied minimum scheduling offset restriction indication carried by DCI in slot *n*, shall be applied in slot *n*+*X* of the scheduling cell. The UE does not expect to be scheduled with DCI format 0\_1 or 1\_1 with ‘Minimum applicable scheduling offset indicator’ field indicating another change to the applied *K*0min and *K*2min for the same active BWP before slot *n+X* of the scheduling cell. If there is active DL BWP change in the scheduling cell after a change indication to a scheduled cell by cross-carrier scheduling in slot *n*, the application delay is converted as where is the numerology of the active DL BWP of the scheduling cell when sending the change indication in slot *n*, and is the numerology of the new active DL BWP of the scheduling cell.<omitted text> |

**Conclusion 1: RAN1 has no consensus in specifying additional UE behavior when receiving an invalid TDRA entry violating the applied K0min/K2min from DCI format 1-0/0-0.**

**Proposal 2: Specify minimumSchedulingOffset to minimumSchedulingOffsetK0 and/or minimumSchedulingOffsetK2 in Section 7.3.1 of TS 38.212 and Section 5.2.1.5.1 in TS 38.214. Discuss and decide the following TPs.**

|  |
| --- |
| 7.3.1.2.2 Format 1\_1<omitted text>- Minimum applicable scheduling offset indicator – 0 or 1 bit - 0 bit if higher layer parameter *minimumSchedulingOffsetK0 and minimumSchedulingOffsetK2* are not configured;- 1 bit if higher layer parameter *minimumSchedulingOffset K0 or minimumSchedulingOffsetK2* is configured. The 1 bit indication is used to determine the minimum applicable K0 for the active DL BWP and the minimum applicable K2 value for the active UL BWP according to Table 7.3.1.1.2-33. If the minimum applicable K0 is indicated, the minimum applicable value of the aperiodic CSI-RS triggering offset for an active DL BWP shall be the same as the minimum applicable K0 value. <omitted text> |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 7.3.1.1.2 Format 0\_1<omitted text>- Minimum applicable scheduling offset indicator – 0 or 1 bit - 0 bit if higher layer parameter *minimumSchedulingOffsetK0 and minimumSchedulingOffsetK2* are not configured;- 1 bit if higher layer parameter *minimumSchedulingOffsetK0 or minimumSchedulingOffsetK2* is configured. The 1 bit indication is used to determine the minimum applicable K0 for the active DL BWP and the minimum applicable K2 value for the active UL BWP according to Table 7.3.1.1.2-33. If the minimum applicable K0 is indicated, the minimum applicable value of the aperiodic CSI-RS triggering offset for an active DL BWP shall be the same as the minimum applicable K0 value. <omitted text>**Table 7.3.1.1.2-33: Joint indication of minimum applicable scheduling offset K0/K2**

|  |  |  |
| --- | --- | --- |
| **Bit field mapped to index** | **Minimum applicable K0 for the active DL BWP, if *minimumSchedulingOffsetK0* is configured for the DL BWP** | **Minimum applicable K2 for the active UL BWP, if *minimumSchedulingOffsetK2* is configured for the UL BWP** |
| 0 | The first value configured by *minimumSchedulingOffsetK0* for the active DL BWP if the first value is configured; 0 otherwise | The first value configured by *minimumSchedulingOffsetK2* for the active UL BWP if the first value is configured; 0 otherwise |
| 1 | The second value configured by *minimumSchedulingOffsetK0* for the active DL BWP if the second value is configured; 0 otherwise | The second value configured by *minimumSchedulingOffsetK2* for the active UL BWP if the second value is configured; 0 otherwise |

<omitted text> |

|  |
| --- |
| 5.2.1.5.1 Aperiodic CSI Reporting/Aperiodic CSI-RS when the triggering PDCCH and the CSI-RS have the same numerology<omitted text>When aperiodic CSI-RS is used with aperiodic reporting, the CSI-RS offset is configured per resource set by the higher layer parameter *aperiodicTriggeringOffset*, including the case that the UE is not configured with *minimumSchedulingOffsetK0* for any DL BWP or *minimumSchedulingOffsetK2* for any UL BWP and all the associated trigger states do not have the higher layer parameter *qcl-Type* set to 'QCL-TypeD' in the corresponding TCI states. The CSI-RS triggering offset has the values of {0, 1, 2, 3, 4, 5, 6, …, 15, 16, 24} slots. If the UE is not configured with *minimumSchedulingOffsetK0* for any DL BWP or *minimumSchedulingOffsetK2* for any UL BWP and if all the associated trigger states do not have the higher layer parameter *qcl-Type* set to 'QCL-TypeD' in the corresponding TCI states , the CSI-RS triggering offset is fixed to zero. The aperiodic triggering offset of the CSI-IM follows offset of the associated NZP CSI-RS for channel measurement.<omitted text> |

**Proposal 3: For clarification on application delay, discuss and decide the following TP.**

|  |
| --- |
| 5.3.1 Application delay of the minimum scheduling offset restriction<omitted text>When the DCI format 0\_1 or 1\_1 with ~~[~~‘Minimum applicable scheduling offset indicator’~~]~~ field indicating a change to the applied *K*0min or *K*2min is contained within the first three symbols of the slot, the value of application delay *X* is determined by, where *K*0minOld ~~is~~ and are the currently applied *K*0min value and the numerology of the active DL BWP in the scheduled cell, respectively, and is the numerology of the active DL BWP of the scheduling cell, and *Zµ* is determined by the subcarrier spacing of the active DL BWP in the scheduling cell, and given in Table 5.3.1-1 ~~and~~ *~~µ~~*~~PDCCH~~ ~~and~~ *~~µ~~*~~PDSCH~~ ~~are the sub-carrier spacing configurations for PDCCH and PDSCH, respectively~~. If *K*0min value is not configured for the active DL BWP in the scheduled cell, *K*0minOld is assumed to take the value zero. When the DCI format 0\_1 or 1\_1 with ~~[~~‘Minimum applicable scheduling offset indicator’~~]~~ field is received outside the first ~~[~~three~~]~~ symbols of the slot, value of *Zµ* from Table 5.3.1-1 is incremented by one before determining the application delay *X* by using the formula of DCI within the first three symbols of the slot.<omitted text> |

**Proposal 4: Confirm the following working assumptions for Rel-16:**

|  |
| --- |
| Agreements (RAN1 #99):For PDCCH monitoring case 1-1 for Cross-carrier scheduling, the application delay of cross-slot scheduling adaptation, denoted by X slot(s) for the scheduling cell, is determined by* X = max(Y, Z)
* Z is determined by the SCS of the active DL BWP of the scheduling cell and takes value of 1/1/2/2 slot(s) for DL SCS of 15/30/60/120 KHz, respectively
* Y is determined as one of the following alternatives:
* (working assumption) ceiling(minK0,scheduled\*2^scheudling/2^scheudled), where minK0,scheduled the minimum applicable K0 value of the active DL BWP of the scheduled cell prior to the change indication for the scheduled cell, scheudling and scheudled are the SCS indices for the scheduling cell and the scheduled cell, respectively.
 |
| Agreement (RAN1 #100b-e):For DCI scheduling PDSCH or PUSCH and indicating active BWP change,* (Working assumption) K0/K2 is no smaller than max(K0min/K2min of source BWP, BWP switch delay)
	+ Numerology conversion is applied to K0min/K2min in case of numerology change between target BWP and source BWP.
* The indicated K0min/K2min of target BWP is always applied starting from the slot of PDSCH or PUSCH scheduled by the DCI
* Clarify the application timing of a K0min/K2min change indicated by a cross-carrier scheduling that is before the DCI indicating active BWP change to a target BWP of different numerology in the scheduling cell.
 |
| Agreements (RAN1 #100b-e):* The minimum scheduling offset restriction is not applied when PDSCH transmission is scheduled with MsgB-RNTI.
* (Working assumption) The minimum scheduling offset restriction is not applied when PDSCH transmission is scheduled with C-RNTI or MCS-C-RNTI in the search space set provided by recoverySearchSpaceId when monitoring PDCCH as described in Section 6 [38.213].
 |

**Proposal 5: UE suggested values for *minimumSchedulingOffsetK0* and *minimumSchedulingOffsetK2* can also be applied to cross-carrier scheduling case.**

* **Note: No change to current RAN2 description in TS 38.331**

To decide the scope for the email discussion, your views for the above proposals will be highly appreciated:

|  |  |
| --- | --- |
| Company | Views for further discussing above proposals and conclusion in email discussion |
| ZTE | First of all, we are okay to discuss the issues identified in Proposal 1~5. More detailed comments are as below.1. According to Figure 1, it seems the numerology conversion in Proposal 1 needs to be applied to “n+X”, instead of “x”;

Meanwhile, if we take a look at the scheduling for PDSCH/PUSCH when the SCS changes, the numerology conversion is applied to “n” as well.

|  |
| --- |
| 5.1.2.1 Resource allocation in time domainGiven the parameter values of the indexed row:- The slot allocated for the PDSCH is *Ks*, where , if UE is configured with *CA-slot-offset* for at least one of the scheduled and scheduling cell, and *Ks* = , |

1. Regarding the presence of the one bit for minimum applicable scheduling offset indicator carried by DCI format 0-1 and 1-1, there are at least three options provided in this meeting.

Option1:

|  |
| --- |
| Format 0\_1/1\_1- Minimum applicable scheduling offset indicator – 0 or 1 bit - 0 bit if higher layer parameter minimumSchedulingOffsetK0 and minimumSchedulingOffsetK2 are not configured;- 1 bit if higher layer parameter minimumSchedulingOffsetK0 and minimumSchedulingOffsetK2 are both configured.  |

Option2:

|  |
| --- |
| Format 0\_1/1\_1- Minimum applicable scheduling offset indicator – 0 or 1 bit - 0 bit if higher layer parameter minimumSchedulingOffsetK0 and minimumSchedulingOffsetK2 are not configured;- 1 bit if higher layer parameter minimumSchedulingOffsetK0 or minimumSchedulingOffsetK2 is configured.  |

Option3:

|  |
| --- |
| 7.3.1.1.2 Format 0\_1<omitted text>Minimum applicable scheduling offset indicator – 0 or 1 bit - 0 bit if higher layer parameter *~~minimumSchedulingOffset~~* *minimumSchedulingOffsetK2* is not configured;- 1 bit if higher layer parameter *~~minimumSchedulingOffset~~* *minimumSchedulingOffsetK2* is configured. 7.3.1.2.2 Format 1\_1<omitted text>Minimum applicable scheduling offset indicator – 0 or 1 bit - 0 bit if higher layer parameter *~~minimumSchedulingOffset~~* *minimumSchedulingOffsetK0* is not configured;- 1 bit if higher layer parameter *~~minimumSchedulingOffset~~* *minimumSchedulingOffsetK0* is configured. |

However, according to the following agreements in RAN1#99, we think the Option3 is the right interpretation.

|  |
| --- |
| Agreements:The presence of the 1-bit indication in DCI format 1-1 and/or 0-1 is determined based on the following:* Following Rel-15 DCI format convention, the 1-bit indication field for minimum applicable scheduling offset is present in DCI format 1-1 (or 0-1) for an active DL BWP (or UL BWP) if higher layer parameter “minimumSchedulingOffset” is configured for the DL BWP (or UL BWP).
 |

 |
| Vivo | The listed issues in Section 2 and 3 is fine for us. For conclusion 1 (related to additional UE behavior when receiving an invalid TDRA entry violating the applied K0min/K2min from DCI format 1-0/0-0), we think so far 8 companies supporting Alt 1(spec impact) and 8 companies supporting Alt 2(no spec impact). So we would like to have more discussions before concluding. Since companies supporting Alt 1 see problems that UE does not easy to recover for such case, we would like to discuss with companies supporting Alt 2 the concerns on have spce impact to solve this issue. But surely further discussions are needed this and next week.Fr section 4, we are also fine with the suggested actions from FL. |
| Ericsson | OK to prioritise issues in Sections 2, 3 and issues A-D in section 4 for the next week’s discussion. The proposals may need more technical discussions, but we assume those will be discussed during next week. |
| Huawei, HiSilicon | We are fine to discuss the proposals suggested by the moderator. Regarding the issue A in section 4 (i.e. the proposal 2 in the summary), we support to discuss this issue. The agreement RAN1#99, in our understanding, is just excluding the option to have the 1-bit to be always present if any BWP is configured with the minimum scheduling offset. Also, the agreement in RAN1#99 is not clear itself and that is why we didn’t resolve the issue during the 212 review email discussion after RAN1#100bis. However, regarding the detailed proposals, we suggest not to directly add the revision on the table. Actually, we see that the issue #F summarised by Weide discusses the same thing as Zhisong proposed. Our suggestion is to discuss these two issues together, otherwise it is difficult to make decision on proposal 2. We think if it is allowed to have only one of the active BWP is configured with the *minimumschedulingoffset*, some issues needs to be further resolved, which is regarding the issue F. For example, if the active UL BWP is configured with *minimumSchedulingOffsetK2* and therefore there is scheduling restriction for the uplink scheduling, however, if the active DL BWP is not configured with *minimumSchedulingOffset*, there would be no DL scheduling restriction. In this case, there is uplink scheduling restriction but there is not any power saving gain on the UE due to no restriction in downlink scheduling. In this case, the scheduling restriction in uplink is meaningless, and we think the applied K2min in this case should be also set to zero. Therefore, we would like to support either not to allow the configuration to have only one of the active BWP configured with *minimumSchedulingOffset* or allow the configuration but define that the K2min fallback to 0 if the active DL BWP is not configured with *minimumSchedlingOffsetK0.*Considering the above aspects, we suggest to further discuss the following options and agree one of them. The detailed TP should be discussed after we have decision among the options:Proposal 2: Specify minimumSchedulingOffset to minimumSchedulingOffsetK0 and/or minimumSchedulingOffsetK2 in Section 7.3.1 of TS 38.212 and Section 5.2.1.5.1 in TS 38.214. Discuss and agree one of the following options:* Option 1: The *minimumSchedulingOffsetK0* and *minimumSchedulingOffsetK2* are required to be configured for any pair of active DL BWP and active UL BWP, if configured.
* Option 2: It is not required that the *minimumSchedulingOffsetK0* and *minimumSchedulingOffsetK2* are configured for any pair of active DL BWP and active UL BWP, if configured.
	+ If *minimumSchedulingoffsetK2* for the active UL BWP is configured and *minimumSchedulingoffsetK0* for the active DL BWP is not configured, both the minimum applicable K0 and the minimum applicable K2 value are set to zero.
	+ If *minimumSchedulingoffsetK0* for the active DL BWP is configured and *minimumSchedulingoffsetK2* for the active UL BWP is not configured, the minimum applicable K0 for the active DL BWP is indicated by the 1 bit indication according to Table 7.3.1.1.2-33 and the minimum applicable K2 value for the active UL BWP is set to zero.
* Option 3: It is not required that the *minimumSchedulingOffsetK0* and *minimumSchedulingOffsetK2* are configured for any pair of active DL BWP and active UL BWP, if configured.
	+ If *minimumSchedulingoffsetK2* for the active UL BWP is configured and *minimumSchedulingoffsetK0* for the active DL BWP is not configured, the minimum applicable K2 for the active UL BWP is indicated by the 1 bit indication according to Table 7.3.1.1.2-33 and the minimum applicable K0 value for the active DL BWP is set to zero.
	+ If *minimumSchedulingoffsetK0* for the active DL BWP is configured and *minimumSchedulingoffsetK2* for the active UL BWP is not configured, the minimum applicable K0 for the active DL BWP is indicated by the 1 bit indication according to Table 7.3.1.1.2-33 and the minimum applicable K2 value for the active UL BWP is set to zero.
 |
| InterDigital | We are fine with discussing the issues suggested by the FL in the summary. We also think that we should discuss the error handling mechanism before drawing a conclusion.  |
| CMCC  | We are fine to discuss the FL proposal in section 2, section 3 and section 4 in next week.But for section 1, we think the slot n should also be converted to the new numerology of scheduling cell.For section 4-A, the three options proposed by ZTE can be as the starting point of next week’s discussion. |
| Samsung | We are generally okay with the proposal. Detailed comments are provided as below:Regarding Proposal 1, we are OK to discuss, but we prefer not to restrict the discussion as starting from the suggested TP that is basically assumed SCS conversion since the reference SCS of application delay is assumed based on the changed BWP. However, in our understanding, it does not need to be based on the changed BWP, but it can be based on the previous BWP where the UE actually received the DCI indicating Kmin value. If it is considered, the specification impact can be minimized. Therefore, we would like to suggest to first discuss the issue whether the reference SCS is based on * Alt 1) the BWP where the UE receives the corresponding DCI indicating Kmin.
* Alt 2) the BWP after BWP switching

After clarify above first, we can discuss further how to capture above as TP.Regarding Conclusion 1, we would like to suggest to discuss it during e-meeting phase rather than concluding it as no consensus without any further discussion since many companies still think the issue is valid and important for operating network Regarding Proposal 2-4, OK to discuss as suggested by FL.Regarding Proposal 5, this corresponds to clarification. We suggest to discuss it as a part of conclusion.Regarding other remaining issues in Section 4, we suggest to discuss further issue “E”. Issue “E” is discussed during RAN1#100b-e meeting and many companies provide their view to support it although only 3 companies are submitted Tdoc including the issue at this meeting. Regarding this, we need to further clarify more general one that what configuration exactly corresponds to the error case. For example,Case 1) If UE is configured with default TDRA table and configured with “minimumSchedulingOffset”, UE assumes this is an error configuration.Case 2) If UE is configured with default TDRA table and configured with “minimumSchedulingOffset”, UE assumes this is an error configuration but UE is not expected to be indicated Kmin is larger than zero.The issue can be further extended to cross-BWP scheduling case.Since it impacts on the UE behaviour, we prefer to clarify this in this meeting. |
| NTT DOCOMO | We are fine to discuss the proposals by FL. For conclusion 1, since many companies still considers it is important to resolve, we also prefer to discuss it before the conclusion, i.e., return back to proposal with two alternatives. |
| Nokia | The proposal by FL for the topics to be discussed in OK for us. Like noted the details will be discussed further in next week but in brief:* In Section 2, on proposal 1 we are fine with the intent to keep the absolute time equal.
* For conclusion in Section 3, similarly as NTT DOCOMO noted, we think we should first try to see if we can start to move either direction to reach consensus and address then the technical solution (if any).
* Section 4; on issue A current RAN2 specification does not seem take a side on this it could be simplest to assume that if configured, configured for both DL and UL, while values can be 0.
 |
| OPPO | For proposal 1, it looks that we understand the behaviour same way. Last meeting we think it can be clarified. Since the problem happened by combination of 2 different DCIs. It may be too much to put another conversion for this specific combination. I wonder if there is another BWP change back, what we do for the 3 DCI combination? Looking at the candidates solutions we agree with HW and Samsung that we can make it simpler. How about just put like this “The UE does not expect to be scheduled with DCI format 0\_1 or 1\_1 with ‘Minimum applicable scheduling offset indicator’ field indicating another change to the applied *K*0min and *K*2min for the same active BWP before time of slot *n+X* of the scheduling cell assuming SCS of the scheduling PDCCH”.Conclusion 1 is ok. We don’t think further discussion will help. This behaviour is eliminated from we agreed in last year. Proposal 2, agree.Proposal 3~5. Ok. |
|  |  |

By the above feedback and further email discussion, the following two email threads are suggested for formal email discussion in RAN1 #101-e meeting:

1. **Proposed email thread 1**: Resolve issues related to the 1-bit indication for Rel-16 cross-slot scheduling adaptation
	* **Topic 1-1**: For an active BWP with minimum scheduling offset restriction(s) configured and when UE detects an invalid TDRA entry violating current applied K0min/K2min from DCI format 1\_0/0\_0, one of the following is decided:
		+ Alt 1-a: UE shall apply a minimum scheduling offset restriction indicated based on ‘Minimum applicable scheduling offset indicator’ value ‘0’
		+ Alt 1-b: UE shall assume same-slot scheduling, i.e., no minimum scheduling offset restriction is applied
		+ Alt 2: No additional RAN1 specification is defined for handling such error case
		+ Note: For Alt 1-a and Alt 1-b, also discuss and specify, if agreed, when the UE behavior is performed.
	* **Topic 1-2**: ‘Minimum applicable scheduling offset indicator field’ is present in DCI format 1\_1 (0\_1) if at least one minimumSchedulingOffsetK0 (minimumSchedulingOffsetK2) is configured in the active DL BWP (UL BWP).
		1. Clarify whether it is allowed to have one active BWP (DL or UL) configured with minimumSchedulingOffset and the other active BWP (UL or DL) is not configured with minimumSchedulingOffset.
		2. Clarify the joint indication if it is allowed to have only DL (UL)L active BWP is configured with at least one minimumSchedlingOffsetK0 (minimumSchedulingOffsetK2).
2. **Proposed email thread 2**: Clarifications and confirmation of working assumptions for Rel-16 cross-slot scheduling adaptation
	* **Topic 2-1**: Discuss and decide the following clarifications for application delay in Section 5.3.1 of TS 38.214
		+ Clarifications for the determination of application delay, starting with the following TP:

|  |
| --- |
| 5.3.1 Application delay of the minimum scheduling offset restriction<omitted text>When the DCI format 0\_1 or 1\_1 with ~~[~~‘Minimum applicable scheduling offset indicator’~~]~~ field indicating a change to the applied *K*0min or *K*2min is contained within the first three symbols of the slot, the value of application delay *X* is determined by,where  *K*0minOld ~~is~~ and are the currently applied *K*0min value and the numerology of the active DL BWP in the scheduled cell, respectively, and is the numerology of the active DL BWP of the scheduling cell, and *Zµ* is determined by the subcarrier spacing of the active DL BWP in the scheduling cell, and given in Table 5.3.1-1 ~~and~~ *~~µ~~*~~PDCCH~~ ~~and~~ *~~µ~~*~~PDSCH~~ ~~are the sub-carrier spacing configurations for PDCCH and PDSCH, respectively~~. If *K*0min value is not configured for the active DL BWP in the scheduled cell, *K*0minOld is assumed to take the value zero. When the DCI format 0\_1 or 1\_1 with ~~[~~‘Minimum applicable scheduling offset indicator’~~]~~ field is received outside the first ~~[~~three~~]~~ symbols of the slot, value of *Zµ* from Table 5.3.1-1 is incremented by one before determining the application delay *X* by using the formula of DCI within the first three symbols of the slot.<omitted text> |

* + - For clarifying the application timing for cross-carrier scheduling case of a K0min/K2min change indicated by a cross-carrier scheduling that is before the DCI indicating active BWP change to a target BWP of different numerology in the scheduling cell, discuss and decide between explicit clarification and implicit clarification for the application timing and associated TP.
			* Example TP for explicit clarification is as follows:

|  |
| --- |
| 5.3.1 Application delay of the minimum scheduling offset restriction<omitted text>When the UE is scheduled with DCI format 0\_1 or 1\_1 with a ‘Minimum applicable scheduling offset indicator’field in slot *n*, it shall determine the *K*0min and *K*2min values to be applied, while the previously applied *K*0min and *K*2min values are applied until the new values take effect. If the DCI in slot *n* also indicates an active DL (UL) BWP change for a serving cell, the indicated *K*0min (*K*2min) value in the new active DL (UL) BWP, if configured, is applied from the slot indicated by the slot offset value of the time domain resource assignment field in the DCI. Otherwise, change of applied minimum scheduling offset restriction indication carried by DCI in slot *n*, shall be applied in slot *n*+*X* of the scheduling cell. The UE does not expect to be scheduled with DCI format 0\_1 or 1\_1 with ‘Minimum applicable scheduling offset indicator’ field indicating another change to the applied *K*0min and *K*2min for the same active BWP before slot *n+X* of the scheduling cell. If there is active DL BWP change in the scheduling cell after a change indication to a scheduled cell by cross-carrier scheduling in slot *n*, the application delay is converted as where is the numerology of the active DL BWP of the scheduling cell when sending the change indication in slot *n*, and is the numerology of the new active DL BWP of the scheduling cell.<omitted text> |

* + - * Example TP for implicit clarification is as follows:

|  |
| --- |
| < Unchanged parts are omitted >5.3.1   Application delay of the minimum scheduling offset restrictionWhen the UE is scheduled with DCI format 0\_1 or 1\_1 with a ‘Minimum applicable scheduling offset indicator’field in slot *n*, it shall determine the *K*0min and *K*2min values to be applied, while the previously applied *K*0min and *K*2min values are applied until the new values take effect. If the DCI in slot *n* also indicates an active DL (UL) BWP change for a serving cell, the indicated *K*0min (*K*2min) value in the new active DL (UL) BWP, if configured, is applied from the slot indicated by the slot offset value of the time domain resource assignment field in the DCI. Otherwise, change of applied minimum scheduling offset restriction indication carried by DCI in slot *n*, shall be applied in slot *n*+*X* of the scheduling cell. The UE does not expect to be scheduled with DCI format 0\_1 or 1\_1 with ‘Minimum applicable scheduling offset indicator’ field indicating another change to the applied *K*0min and *K*2min for the same active BWP before slot *n+X* of the scheduling cell.When the DCI format 0\_1 or 1\_1 with [‘Minimum applicable scheduling offset indicator’**]** field indicating a change to the applied *K*0min or *K*2min is contained within the first three symbols of ~~the~~ slot *n*, the value of application delay *X* is determined by, where  *K*0minOld is the currently applied *K*0min value of the active DL BWP in the scheduled cell, and *Zµ* is determined by the subcarrier spacing of the active DL BWP in the scheduling cell in slot *n*, and given in Table 5.3.1-1 and *µ*PDCCH and *µ*PDSCH are the sub-carrier spacing configurations for PDCCH in slot *n* and PDSCH, respectively< Unchanged parts are omitted > |

* + **Topic 2-2**: For clarification of Rel-16 UE assistance information for cross-slot scheduling, discuss and decide the following proposal:

|  |
| --- |
| Proposal: UE suggested values for minimumSchedulingOffsetK0 and minimumSchedulingOffsetK2 can also be applied to cross-carrier scheduling case.* Note: It is up to network how to consider other factors (e.g., delta values for cross-carrier scheduling, TS 38.214, Section 5.5) in addition to the UE suggested value in determining minimumSchedulingOffsetK0 or minimumSchedulingOffsetK2 for cross-carrier scheduling.
 |

* + **Topic 2-3**: Confirm the following work assumptions for Rel-16:

|  |
| --- |
| Agreements (RAN1 #99):For PDCCH monitoring case 1-1 for Cross-carrier scheduling, the application delay of cross-slot scheduling adaptation, denoted by X slot(s) for the scheduling cell, is determined by* X = max(Y, Z)
* Z is determined by the SCS of the active DL BWP of the scheduling cell and takes value of 1/1/2/2 slot(s) for DL SCS of 15/30/60/120 KHz, respectively
* Y is determined as one of the following alternatives:
* (working assumption) ceiling(minK0,scheduled\*2^scheudling/2^scheudled), where minK0,scheduled the minimum applicable K0 value of the active DL BWP of the scheduled cell prior to the change indication for the scheduled cell, scheudling and scheudled are the SCS indices for the scheduling cell and the scheduled cell, respectively.
 |
| Agreement (RAN1 #100b-e):For DCI scheduling PDSCH or PUSCH and indicating active BWP change,* (Working assumption) K0/K2 is no smaller than max(K0min/K2min of source BWP, BWP switch delay)
	+ Numerology conversion is applied to K0min/K2min in case of numerology change between target BWP and source BWP.
* The indicated K0min/K2min of target BWP is always applied starting from the slot of PDSCH or PUSCH scheduled by the DCI
* Clarify the application timing of a K0min/K2min change indicated by a cross-carrier scheduling that is before the DCI indicating active BWP change to a target BWP of different numerology in the scheduling cell.
 |
| Agreements (RAN1 #100b-e):* The minimum scheduling offset restriction is not applied when PDSCH transmission is scheduled with MsgB-RNTI.
* (Working assumption) The minimum scheduling offset restriction is not applied when PDSCH transmission is scheduled with C-RNTI or MCS-C-RNTI in the search space set provided by recoverySearchSpaceId when monitoring PDCCH as described in Section 6 [38.213].
 |

# [101-e-NR-NR\_UE\_Pow\_Sav-Cross\_Slot-01] Email discussion/approval to resolve issues related to the 1-bit indication for Rel-16 cross-slot scheduling adaptation

In this section, email discussion according to the following chair’s approval will be recorded:

|  |
| --- |
| [101-e-NR-NR\_UE\_Pow\_Sav-Cross\_Slot-01] Email discussion/approval to resolve issues related to the 1-bit indication for Rel-16 cross-slot scheduling adaptation* Topic 1-1: For an active BWP with minimum scheduling offset restriction(s) configured and when UE detects an invalid TDRA entry violating current applied K0min/K2min from DCI format 1\_0/0\_0, one of the following is decided:
	+ Alt 1-a: UE shall apply a minimum scheduling offset restriction indicated based on ‘Minimum applicable scheduling offset indicator’ value ‘0’
	+ Alt 1-b: UE shall assume same-slot scheduling, i.e., no minimum scheduling offset restriction is applied
	+ Alt 2: No additional RAN1 specification is defined for handling such error case
	+ Note: For Alt 1-a and Alt 1-a, also discuss and specify, if agreed, when the UE behavior is performed.
* Topic 1-2: ‘Minimum applicable scheduling offset indicator field’ is present in DCI format 1\_1 (0\_1) if at least one minimumSchedulingOffsetK0 (minimumSchedulingOffsetK2) is configured in the active DL BWP (UL BWP).
	+ Clarify whether it is allowed to have one active BWP (DL or UL) configured with minimumSchedulingOffset and the other active BWP (UL or DL) is not configured with minimumSchedulingOffset.
	+ Clarify the joint indication if it is allowed to have only DL (UL)L active BWP is configured with at least one minimumSchedlingOffsetK0 (minimumSchedulingOffsetK2).

by 5/29, with potential TPs by 6/3 – Weide (MTK) |

To facilitate the decision, the following phases are to be suggested:

* **Phase I (due 26th May 11 pm PST)**: Collection of companies views
* **Phase II (27th May 3 am PST –28th May 11 pm PST)**: Convergence on the proposal(s) (with potential initial TP(s), if agreed)
* **Phase III (1st June 3 am PST – 3rd June 11 pm PST)**: Convergence on the TP(s), if necessary from the agreed proposal(s)

Since there are two topics in the email thread, Section 6.1 and Section 6.2 will be devoted for Topic 1-1 and Topic 1-2, respectively.

## Topic 1-1: Error Handling when UE Detects an Invalid TDRA Entry from DCI Format 1\_0/0\_0

For this topic, we are to decide one of the following proposal among Alt 1-a, Alt 1-b and Alt 2 according to the following email discussion scope:

|  |
| --- |
| Topic 1-1: For an active BWP with minimum scheduling offset restriction(s) configured and when UE detects an invalid TDRA entry violating current applied K0min/K2min from DCI format 1\_0/0\_0, one of the following is decided:* Alt 1-a: UE shall apply a minimum scheduling offset restriction indicated based on ‘Minimum applicable scheduling offset indicator’ value ‘0’
* Alt 1-b: UE shall assume same-slot scheduling, i.e., no minimum scheduling offset restriction is applied
* Alt 2: No additional RAN1 specification is defined for handling such error case
* Note: For Alt 1-a and Alt 1-b, also discuss and specify, if agreed, when the UE behavior is performed.
 |

Since this topic is a follow-up of RAN1 #100-Bis-e, companies can check **Section** 3 for the related summary of companies’ views in their contributions. To target final decision, companies are encouraged to provide their views for the final selection in Table 4.

Table 4: Summary of companies' selections and views for Topic 1-1

|  |  |  |
| --- | --- | --- |
| **Company** | **Selection(Alt 1-a/1-b/2)** | **View/Reason and suggested initial TP, if any** |
| OPPO | Alt2  | Again, there is no valid motivation to introduce alt1The fallback DCI and non-fall back does not have extreme large performance difference. 10bits reduction only means 1 dB improvement (proven by many earlier evaluation). It also means few percentages of BLER. The gNB can transmit in higher aggregation level.We don’t think we need introduce it in this stage. |
| ZTE | Alt 1-b | When DCI format 1\_0/0\_0 with an invalid TDRA entry is detected, it is most likely that UE has missed an indication of minimum K0min/K2min . To guarantee the performance of subsequent data scheduling, the applied minimum K0min/K2min should be updated. However, the channel condition may not be good enough for UE to successfully decode the non-fall back DCI (format 0-1 /1-1) . Hence, defining UE behavior in this case is a promising alternative. Considering that the Alt 1-a does not work when there is only one minimum scheduling offset restriction configured for DL/UL BWP, Alt 1-b is preferred. |
| Samsung | Either Alt 1-a or Alt 1-b | We think this should be captured in the specification not to make unintended system performance degradation as discussed many times before. Although we think Alt 1-a is still workable when there is only one minimum scheduling offset configuration based on the gNB implementation, but if some companies have concerns on Alt 1-a, we are also fine with Alt 1-b as compromise.  |
| CMCC | Alt 2 | As the discussion in preparation phase, the case which UE receives an invalid TDRA entry is that UE assumes the minimum K0/K2 is larger than zero, but gNB wants to schedule UE in same-slot scheduling.There are two reasons: 1) the 1-bit indication to change from cross-slot scheduling to same-slot scheduling in DCI format 0\_1/1\_1 is miss detected by UE2) gNB wants to schedule UE in same-slot scheduling but the DCI format 0\_1/1\_1 cannot be received by UE correctlyWhatever the reason 1) or 2), if gNB wants to schedule UE in same-slot scheduling, gNB can first re-configure the minimum K0/K2 to zero via RRC Reconfiguration, and then schedule UE in same-slot scheduling.Therefore, we support Alt 2 due to gNB can re-configure the minimum K0/K2 as the above discussion and no additional behaviour needed to be defined. |
| Spreadtrum | Alt2 | We still suppose this is an implementation issue.The point we discuss here is about fall back DCI (e.g. DCI 0\_0/ DCI 1\_0), since fall back DCI does not have 1-bit indication to recover the K0min/K2min. The error case is the UE missed the non-fall back DCI which indicates the UE to change the K0min/K2min value and then receives a fall back DCI which indicates an invalid TDRA entry. However, this error case can be prevented by gNB implementation. If the gNB does not receive ACK/NACK or UL data related to the indication DCI from UE side, the NW should not change the K0min/K2min value (i.e. continue using the old K0min/K2min value).  |
| Huawei, HiSilicon | Alt.2 | We support Alt 2 (No spec change) as there is no reason to specify it. In the case when UE an invalid TDRA entry is detected, the UE can always fallback to a ‘safe’ operating state, e.g. fallback to same slot scheduling assumption or the smaller configured K0min/K2min value, by UE implementation. Even when an invalid TDRA entry is indicated by DCI format 0\_0 or 1\_0, the UE can also fallback to same-slot scheduling or the smaller configured K0min/K2min restriction by UE implementation. |
| MediaTek | Alt 2 | The probability of such case should be low, as commented by CMCC, and there are existing solutions to resolve this issue, including* When gNodeB detects that UE misses the DCI, gNodeB can soon re-align UE with DCI format 1\_1/0\_1 **with potentially larger AL**.
* If UE **statically** stayed in a poor condition after missing a DCI format 1\_1/0\_1 that indicates change to K0min/K2min, gNodeB can reconfigure and re-align UE **via RRC**

Given the above, we suggest no need of additional specification. |
| Panasonic | Alt 2 |  |
| CATT | Alt 2 | This is a gNB implementation error and should not be specified in the spec.  |
| InterDigital | Alt 1-b | We agree with Samsung that the solution should be captured in the specification not to make unintended system performance degradation. |
| Nokia | Alt 1b | Like discussed, that while the probability of miss-detection of DCI 0\_1/1\_1 should be relatively low, introducing this kind of UE autonomous recovery mechanism would facilitate preventing additional delays due to loss of synchronisation between NW and UE. |
| Qualcomm | Alt 2 | We think this is UE’s implementation issue. Compared to other misalignment cases between UE and gNB, which requires additional handling (e.g., BWP inactivity timer), the misalignment of K0min/K2min is easy to detect and the impact is less significant, because the UE can still receive PDCCH. Thus, the UE can handle the misalignment in an implementation specific manner. |
| Intel | Alt 2 | It was agreed in RAN1 #97 that UE does not expect TDRA field in DCI indicating a value K0 or K2 that is not smaller than the indicated minimum scheduling offset value. Hence, receiving an invalid entry is a gNB miss-configuration and UE behaviour does not have to be captured for such error cases that is not likely to happen. This is not limited to any given DCI formats. Such events, e.g., back to back DCI miss-detection, may happen rarely and at least based on HARQ-ACK feedback, gNB can adjust indication accordingly. |
| Sony | Alt 1-a | We see that there are two cases where the UE could receive an invalid TDRA entry: (1) UE misses DCI format 1\_1/0\_1 or (2) gNB intentionally sends an invalid TDRA entry to move the UE towards a same-slot scheduling state.We think that the gNB can be aware of (1), either by not receiving a PUCCH or not receiving a PUSCH. If the gNB is aware of the error, it can continue scheduling in the more cross-slot mode.To support the intentional invalid TDRA entries of (2), the UE functionality needs defining and hence we prefer Alt 1-a. We note however that there is no equivalent way for the gNB to intentionally move the UE from a same-slot state towards a cross-slot state.If Alt 2 is adopted, we think that the gNB should not assume that the UE will “fallback to a ‘safe’ operating state, e.g. fallback to same slot scheduling assumption or the smaller configured K0min/K2min value, by UE implementation”  |
| NTT DOCOMO | Alt 1-a or Alt 1-b | We think the UE behavior in case of detecting an invalid TDRA entry in DCI 1\_0/0\_0 should be specified. Even if this can be UE implementation, gNB cannot know such UE implementation. Among supporting company on Alt 2, there are different views, i.e., UE implementation or gNB implementation.We are okay with either of Alt 1-a or Alt 1-b, and the comments on the alternatives respectively are:For Alt 1-a, if only one minimumSchedulingOffset is configured, the UE behaviour in such case should be no restriction.For Alt 1-b, it would be better to just mention “UE shall assume no restriction” instead of same-slot scheduling, since the actual scheduling offset is up to gNB. |
| Ericsson  | Alt 2 | We do not see a need for additional specification to handle this case. The NW can use DCI 0\_1/1\_1 to reset the minimum scheduling offset or continue to use DCI 0\_0/1\_0/0\_1/1\_1 with permissible TDRA values. We further note the using fallback DCI for indicating scheduling offset was discussed in the WI but not agreed.  |
| LG | Alt 1-a or Alt 1-b | DCI format 0\_1/1\_1 could reset the minimum scheduling offset, but latency for resetting minK0/minK2 can be increased in some cases; for example, poor channel condition of DCI format 0\_1/1\_1, or longer monitoring periodicity of DCI format 0\_1/1\_1. So, our preference is Alt 1-a/1-b.  |
| Apple | Alt 2 |  |

By the above summary, there are 4 company supporting Alt 1-a, 6 companies supporting Alt 1-b, , and 12 companies supporting Alt 2:

|  |  |
| --- | --- |
| **Alt 1-a (4)**: UE shall apply a minimum scheduling offset restriction indicated based on ‘Minimum applicable scheduling offset indicator’ value ‘0’  | Samsung, Sony, DoCoMo, LG |
| **Alt 1-b (6)**: UE shall assume same-slot scheduling, i.e., no minimum scheduling offset restriction is applied | ZTE, Samsung, InterDigital, Nokia, DoCoMo, LG |
| **Alt 2** **(12)**: No additional RAN1 specification is defined for handling such error case | OPPO, CMCC, Spreadtrum, Huawei, HiSilicon, MediaTek, Panasonic, CATT, Qualcomm, Intel, Ericsson, Apple |

From companies’ feedbacks, the major debate point is whether additional specification is needed to reduce the recovery delay for the issue of potentially low probability. Since companies’ views are diverse and consensus is not likely achieved, it is suggested to capture a conclusion and reflect the status for Rel-16. After companies’ check, there is no objection received, and chairman finally approved the following conclusion, as can be check in [20]:

Conclusion

RAN1 have no consensus in specifying additional UE behavior when UE receives an invalid TDRA entry from DCI format 1\_0/0\_0.

## Topic 1-2: Presence of ‘Minimum Applicable Scheduling Offset Indicator Field’ and Joint Indication

For this topic, we need to clarify two questions before identifying the required specification change, if any, according to the email discussion scope:

|  |
| --- |
| Topic 1-2: ‘Minimum applicable scheduling offset indicator field’ is present in DCI format 1\_1 (0\_1) if at least one minimumSchedulingOffsetK0 (minimumSchedulingOffsetK2) is configured in the active DL BWP (UL BWP).1. Clarify whether it is allowed to have one active BWP (DL or UL) configured with minimumSchedulingOffset and the other active BWP (UL or DL) is not configured with minimumSchedulingOffset.
2. Clarify the joint indication if it is allowed to have only DL (UL)L active BWP is configured with at least one minimumSchedlingOffsetK0 (minimumSchedulingOffsetK2).
 |

In Table 5, companies are encouraged to provide views for the above two questions and the suggested specification impact(s):

Table 5: Summary of companies' views for Topic 1-2

|  |  |
| --- | --- |
| **Company** | **View for question a)** |
| **View for question b)** |
| **Suggested specification impact(s) (e.g. to Section 7.3.1 of TS 38.212), if any** |
| OPPO | a) This is naturally results by the configuration of current 38.331. Thus, our answer is: it is allowed.If we don’t allow, we have to send LS to RAN2 and ask them change 331. No need to spend that time. |
| b) If only one of the minimumSchedlingOffsetK0 (minimumSchedulingOffsetK2), the other configured entry is ‘0’(same text is already in the spec for configured secondary entry) |
| The TP combined by [13] and [16] is fine. |
| ZTE | Yes, it is allowed to have one DL/UL active BWP configured with K0min/K2min.According to 38.213, for TDD operation, a pair of DL and UL BWP with the same bwp-ID is linked, i.e. UL and DL BWP switch simultaneously. While for FDD operation, there is no such a linkage.Hence, for TDD operation, if a pair of DL and UL BWP is configured with K0min and K2min, respectively, they would be activated or de-activated at the same time, it can work with the requirement of “both DL and UL active BWPs are expected to be configured with theminimumSchedulingOffset”. However, for FDD operation, the DL and UL BWP switch are performed separately. Even there is one pair of DL and UL BWP that is configured with K0min and K2min, it can not be guaranteed that that pair of DL and UL BWP would be active at the same time. Therefore, having one DL/UL active BWP configured with K0min/K2min is allowed. |
| Regarding the understanding of the joint indication, the information field of minimum applicable scheduling offset indicator in DCI format 0\_1/1\_1 can be used to indicate both the applied K0min and K2min if minimumSchedulingOffsetK0 and minimumSchedulingOffsetK2 are configured for active DL and UL BWP, respectively. If the active DL (UL) BWP is not configured with minimumSchedulingOffset, there is no restriction applied to the DL/UL transmission. |
| 7.3.1.1.2 Format 0\_1<omitted text>Minimum applicable scheduling offset indicator – 0 or 1 bit - 0 bit if higher layer parameter *~~minimumSchedulingOffset~~* *minimumSchedulingOffsetK2* is not configured;- 1 bit if higher layer parameter *~~minimumSchedulingOffset~~* *minimumSchedulingOffsetK2* is configured. 7.3.1.2.2 Format 1\_1<omitted text>Minimum applicable scheduling offset indicator – 0 or 1 bit - 0 bit if higher layer parameter *~~minimumSchedulingOffset~~* *minimumSchedulingOffsetK0* is not configured;- 1 bit if higher layer parameter *~~minimumSchedulingOffset~~* *minimumSchedulingOffsetK0* is configured.**Table 7.3.1.1.2-33: Joint indication of minimum applicable scheduling offset K0/K2**

|  |  |  |
| --- | --- | --- |
| **Bit field mapped to index** | **Minimum applicable K0 for the active DL BWP, if *minimumSchedulingOffsetK0* is configured for the DL BWP** | **Minimum applicable K2 for the active UL BWP, if *minimumSchedulingOffsetK2* is configured for the UL BWP** |
| 0 | The first value configured by *minimumSchedulingOffsetK0* for the active DL BWP if the first value is configured; 0 otherwise | The first value configured by *minimumSchedulingOffsetK2* for the active UL BWP if the first value is configured; 0 otherwise |
| 1 | The second value configured by *minimumSchedulingOffsetK0* for the active DL BWP if the second value is configured; 0 otherwise | The second value configured by *minimumSchedulingOffsetK2* for the active UL BWP if the second value is configured; 0 otherwise |

 |
| Samsung | a) It is allowed. |
| b) We share the same view with OPPO. |
| c) We are okay with the combined TPs from [13] and [16] as suggested by ZTE. |
| CMCC | a) At least for TDD, the minimumSchedulingOffset should be configured to pair of DL BWP and UL BWP, otherwise, the power saving gain will not be guaranteed because UE doesn't know the DCI is for PDSCH scheduling or PUSCH scheduling. For FDD, because there is no association between DL BWP and UL BWP, it is allowed to configure minimumSchedulingOffset on one active BWP (DL or UL) and not configure minimumSchedulingOffset on the other active BWP (UL or DL) . |
| b)To increase the signalling flexibility of minimum applicable scheduling offset indication, if only DL (UL)L active BWP is configured with at least one minimumSchedlingOffsetK0 (minimumSchedulingOffsetK2), both the 1-bit indication in DCI 0\_1/DCI 1\_1 can be used to indicate the minimum K0/K2. |
| 7.3.1.1.2 Format 0\_1<Unchanged parts are omitted>- Minimum applicable scheduling offset indicator – 0 or 1 bit - 0 bit if higher layer parameter *minimumSchedulingOffsetK0* and *minimumSchedulingOffsetK2* are not configured;- 1 bit if higher layer parameter *minimumSchedulingOffsetK0* or *minimumSchedulingOffsetK2* is configured.7.3.1.1.3 Format 1\_1<Unchanged parts are omitted>- Minimum applicable scheduling offset indicator – 0 or 1 bit - 0 bit if higher layer parameter *minimumSchedulingOffsetK0* and *minimumSchedulingOffsetK2* are not configured;- 1 bit if higher layer parameter *minimumSchedulingOffsetK0* or *minimumSchedulingOffsetK2* is configured. |
| Spreadtrum | For question a): it can be allowed.From the perspective of UE power saving, this should not be allowed, the minimumSchedulingOffsetK0 and minimumSchedulingOffsetK2 are required to be configured for any pair of active DL BWP and active UL BWP, if configured.But considering the gNB’s flexibility on RRC configurations, this should be allowed. We slightly prefer “allowed”, since power saving gain can be achieved by gNB’s configuration. |
| For question b): it can be allowed.Regarding the 1-bit joint indication of minimumSchedulingOffsetK0 and minimumSchedulingOffsetK2, our original understanding is that each code point would be associated with a pair of value (K0min, K2min), which means the number of candidate values of minimum applicable K0 and K2 should be the same. But according to the table 7.3.1.1.2-33 and ZTE’s description: “If the active DL (UL) BWP is not configured with minimumSchedulingOffset, there is no restriction applied to the DL/UL transmission.” joint indication is still workable when the number of candidate values of minimum applicable K0 and K2 are different. So we think this can be allowed.  |
| We are okay with the combined TPs as suggested by ZTE. |
| Huawei, HiSilicon | 1. We are fine to agree that it is allowed to have one active BWP (DL or UL) configured with *minimumSchedulingOffset* and the other active BWP (UL or DL) is not configured with *minimumSchedulingOffset*. However, we prefer to exclude the case when the applied minK0 is 0 and the applied minK2 is not zero. The UE cannot have any power saving with the loss of scheduling flexibility.
 |
| 1. The joint indication is intended to have proper combination of K0min and K2min to be applied together, which can also introduce the flexibility to use either uplink scheduling DCI or DL scheduling DCI to indicate the change.

Therefore, we think the 1-bit indication field is present when either active DL BWP or active UL BWP is configured with the *minimumSchedulingOffset*.Furthermore, to guarantee the motivation/benefit of joint indication, if only active UL BWP has been configured with *minimumSchedulingOffsetK2* and the active DL BWP has not been configured with *minimumSchedulingOffsetK0*, we prefer to set both the applied K0min and K2min to zero slot. |
| 1. Firstly, in TS 38.214, it is described clearly as bellow that if there is configuration of minimumSchedulingOffsetK0 for the active DL BWP, there is minimum scheduling restriction indicated by the ‘Minimum applicable scheduling offset indicator’field in DCI format 0\_1 or 1\_1. Therefore, there is no need to revise Table 7.3.1.1.2-33 to add some description like “if the first value is configured; 0 otherwise”. According to 214, there is no restriction if there is no configured first value.

Also, based on the reason in a) and b), we suggest the following TP:--------------------------------- Start of Text Proposal--------------------------------------< Unchanged parts are omitted >7.3.1.1.2 Format 0\_1< Unchanged parts are omitted >- Minimum applicable scheduling offset indicator – 0 or 1 bit - 0 bit if higher layer parameter *minimumSchedulingOffsetK0 and minimumSchedulingOffsetK2* are~~is~~ not configured;- 1 bit if higher layer parameter *minimumSchedulingOffsetK0 or minimumSchedulingOffsetK2* is configured. The 1 bit indication is used to determine the minimum applicable K0 for the active DL BWP and the minimum applicable K2 value for the active UL BWP according to Table 7.3.1.1.2-33. If the minimum applicable K0 is indicated, the minimum applicable value of the aperiodic CSI-RS triggering offset for an active DL BWP shall be the same as the minimum applicable K0 value. If *minimumSchedulingoffsetK2* for the active UL BWP is configured and *minimumSchedulingoffsetK0* for the active DL BWP is not configured, the minimum applicable K2 value for the active UL BWP is set to zero.< Unchanged parts are omitted >7.3.1.2.2 Format 1\_1< Unchanged parts are omitted >- Minimum applicable scheduling offset indicator – 0 or 1 bit - 0 bit if higher layer parameter *minimumSchedulingOffsetK0 and minimumSchedulingOffsetK2* are~~is~~ not configured;- 1 bit if higher layer parameter *minimumSchedulingOffsetK0 or minimumSchedulingOffsetK2* is configured. The 1 bit indication is used to determine the minimum applicable K0 for the active DL BWP and the minimum applicable K2 value for the active UL BWP according to Table 7.3.1.1.2-33. If the minimum applicable K0 is indicated, the minimum applicable value of the aperiodic CSI-RS triggering offset for an active DL BWP shall be the same as the minimum applicable K0 value. If *minimumSchedulingoffsetK2* for the active UL BWP is configured and *minimumSchedulingoffsetK0* for the active DL BWP is not configured, the minimum applicable K2 value for the active UL BWP is set to zero.< Unchanged parts are omitted >---------------------------------- End of Text Proposal ------------------------------- |
| MediaTek | For question a), current specification allows configuration of minimum scheduling offset restriction only in active DL BWP or active UL BWP. |
| For question b), joint indication can be utilized when there is the 1-bit indication in the transmitted DCI. For the case without the 1-bit indication in the transmitted DCI, UE should keep using currently applied K0min and K2min. However, it is network flexibility to always configure as least one restriction in each of DL and UL BWPs so that the 1-bit is always present in both DCI formats 1\_1 and 0\_1. Additional specification is not needed to enforce the present of the 1-bit indication. |
| The suggested TP combining those in [13] and [16] looks good for us |
| Panasonic | For a), it is allowed in our understanding. |
| For b), it is also allowed to only adapt DL or UL minimumScheudlingOffsetK0/K2. In case of that, the joint indication is naturally equal to the indication of the configured DL or UL BWP minimum scheduling offset. |
| The TP from ZTE is fine. |
| CATT | 1. It is allowed
 |
| 1. The dynamic indication of minimumSchedulingOffsetK0/K2 is independent. The power saving could be achieved without dynamic indication.
 |
| We are OK with ZTE’s TP. |
| InterDigital | Allowed. |
| We agree with OPPO. |
| The TP from ZTE is fine. |
| Nokia | A) As expressed by other companies, current RAN2 specification seems to allow independent configuration of scheduling slot offset restriction for DL or UL BWP only, or more generally configure different number of values per BWP (e.g. 0,1,2). So the proposed adjustments to Table 7.3.1.1.2-33 would be needed so that the minimum scheduling offset values BWP would be by set independently.  |
| B) If the K0min (K2min) in configured by RRC to DL (UL) BWP, then, following the Rel-15 behaviour the ‘Minimum applicable scheduling offset indicator’ bit is added to DCI format 1\_1 (0\_1) only. While this implies that NW needs to trigger the change with corresponding DCI (DL or UL), it is probably preferable to restrict the DCI format changes (in case of BWP switch) to corresponding BWP. |
| We are OK with the TPs proposed by ZTE. |
| Qualcomm | In our view, according to the RAN1 #99 agreement, it is possible to have only one active BWP (DL or UL) configured with minimumSchedulingOffset and the other active BWP (UL or DL) without minimumSchedulingOffset. Although there was a concern that configuring only minK2 without configuring minK0 may not provide much power saving gain, it should be up to network – a sensible network may avoid such configuration, possibly with the assistance of UE suggested K0/K2 values. Also, configuring only minK2 without minK0 configuration may enable PUSCH processing timeline relaxation, which can provide a power saving gain depending on UE implementation, and thus it is not required to be precluded. |
| The joint indication for DL and UL active BWPs should be applied only when both DL and UL BWPs are configured with at least one minimumSchedulingOffset value. Therefore, if only one active BWP (DL or UL) is configured with minimumSchedulingOffset, no restriction is applied for the other active BWP (UL or DL). In other word, min applicable scheduling offset of ‘zero’ slot is assumed for the BWP w/o minimumSchedulingOffset configuration, regardless of the 1-bit indication in the scheduling DCI. |
| We support the TPs proposed by ZTE. |
| Intel | Allowed |
| Allowed, Agree with ZTE and OPPO that if active DL (UL) BWP is not configured with minimumSchedulingOffset, there is no restriction applied to the DL/UL transmission, i.e., 0 is assumed. |
| The TP from ZTE is fine. |
| Sony | Agree with OPPO |
| Agree with OPPO |
| Agree with OPPO |
| NTT DOCOMO | a) It should be allowed. Although it seems that in most cases minimumSchedulingOffset is configured for both DL BWP and UL BWP, there is no need of restriction. |
| b) For the BWP without the configuration of minimumSchedulingOffset, there is no restriction even if ‘Minimum applicable scheduling offset indicator field’ is received. |
| We support the TP suggested by ZTE. |
| Ericsson | It is allowed as per current RAN2 specification.  |
| As per the RAN1 agreement, following Rel-15 DCI format convention, the 1-bit indication field for minimum applicable scheduling offset is present in DCI format 1-1 (or 0-1) for an active DL BWP (or UL BWP) if higher layer parameter “minimumSchedulingOffset” is configured for the DL BWP (or UL BWP). If there is no minimum scheduling offset for a BWP, then there should be no restriction.  |
| We are OK with part of ZTE’s TP (i.e. from [16]), but we have a question related to the proposed update to table 7.3.1.1.2-33. Given the second column defines “*Minimum applicable K0 for the active DL BWP, if minimumSchedulingOffsetK0 is configured for the DL BWP*” (and similarly for 3rd column), the change in 2nd row of the table seems redundant?  |
| LG | It is allowed. |
| Agree with OPPO. |
| We are OK with the TP from ZTE. |
| Apple | a) allowed |
| b) agree with OPPO |
| c) OK with the TP |

From the above table, the following can be summarized:

* Question a) (): All companies think it is allowed by the spec.
	+ While it is gNodeB flexibility, 3 companies think we should have proper configurations for each pair of DL and UL BWPs in order to achieve power saving gain
	+ Most companies agree with ZTE suggested TP where the content of Table 7.3.1.1.2-33 is adjusted to accommodate the case only active DL BWP or active UL BWP is configured with the scheduling offset restriction.
* Question b): There are two aspect in companies’ views
	+ When there is no configured restriction for active DL (UL) BWP while UE receives the 1-bit indication from UL (DL) scheduling DCI, all companies agree no restriction, i.e., K0min (K2min) = 0, is applied for the active DL (UL) BWP
	+ 2 companies suggest the 1-bit indication should be present whenever there is one configured restriction in either active DL or UL BWP. But most companies agree with ZTE TP where 1-bit indication is present in DCI format 1\_1 (0\_1) only depends on whether there is configured restriction in current active DL (UL) BWP.
* Question c): There are 16 out of 18 companies support the TP combining those from [13] and [16] and is summarized by ZTE.

By the above summary, it is recommended to further discuss the TP suggested by ZTE. Since Ericsson and Huawei think no issue in reusing Table 7.3.1.1.2-33, the following agreements and initial TP are agreed for TP phase discussion, as can be check in [21]:

Proposed agreements: Discuss and decide TPs for clarifying

* ‘Minimum applicable scheduling offset indicator field’ is present in DCI format 1\_1 (0\_1) only when at least one value is configured by minimumSchedulingOffsetK0 (minimumSchedulingOffsetK2) for the active DL (UL) BWP
* Joint indication when only one of active DL BWP and active UL BWP is configured with scheduling offset restriction
* Initial TPs for TP phase discussion are as follows:

|  |
| --- |
| (TS 38.212)7.3.1.1.2               Format 0\_1<omitted text>-     Minimum applicable scheduling offset indicator – 0 or 1 bit -     0 bit if higher layer parameter*~~minimumSchedulingOffset~~ minimumSchedulingOffsetK2* is not configured;-     1 bit if higher layer parameter*~~minimumSchedulingOffset~~ minimumSchedulingOffsetK2* is configured. The 1 bit indication is used to determine the minimum applicable K~~0~~2 for the active ~~DL~~ UL BWP and the minimum applicable K~~2~~0 value for the active ~~UL~~ DL BWP, if configured respectively, according to Table 7.3.1.1.2-33. If the minimum applicable K0 is indicated, the minimum applicable value of the aperiodic CSI-RS triggering offset for an active DL BWP shall be the same as the minimum applicable K0 value. <omitted text>7.3.1.2.2               Format 1\_1<omitted text>-     Minimum applicable scheduling offset indicator – 0 or 1 bit -     0 bit if higher layer parameter*~~minimumSchedulingOffset~~ minimumSchedulingOffsetK0* is not configured;-     1 bit if higher layer parameter*~~minimumSchedulingOffset~~ minimumSchedulingOffsetK0* is configured. The 1 bit indication is used to determine the minimum applicable K0 for the active DL BWP and the minimum applicable K2 value for the active UL BWP, if configured respectively, according to Table 7.3.1.1.2-33. If the minimum applicable K0 is indicated, the minimum applicable value of the aperiodic CSI-RS triggering offset for an active DL BWP shall be the same as the minimum applicable K0 value.  <omitted text> |

|  |
| --- |
| (TS 38.214)5.1.2.1          Resource allocation in time domain<omitted text>When the UE configured with *minimumSchedulingOffsetK0* in an active DL BWP it applies a minimum scheduling offset restriction indicated by the ‘Minimum applicable scheduling offset indicator’field in DCI format ~~0~~1\_1 or DCI format 0~~1~~\_1, if the same field is also available. When the UE is configured with *minimumSchedulingOffsetK0* in an active DL BWP and it has not received ‘Minimum applicable scheduling offset indicator’ field in DCI format 0\_1 or 1\_1, the UE shall apply a minimum scheduling offset restriction indicated based on ‘Minimum applicable scheduling offset indicator’ value ‘0’. When the minimum scheduling offset restriction is applied the UE is not expected to be scheduled with a DCI in slot *n* to receive a PDSCH scheduled with C-RNTI, CS-RNTI or MCS-C-RNTI with *K*0 smaller than, where *K*0minand are the applied minimum scheduling offset restriction and the numerology of the active DL BWP of the scheduled cell when receiving the DCI in slot *n,* respectively, and is the numerology of the new active DL BWP in case of active DL BWP change in the scheduled cell and is equal to , otherwise. The minimum scheduling offset restriction is not applied when PDSCH transmission is scheduled with C-RNTI, CS-RNTI or MCS-C-RNTI in common search space associated with CORESET0 and default PDSCH time domain resource allocation is used, in the search space set provided by *recoverySearchSpaceId* when monitoring PDCCH as described in [6, TS 38.213] or when PDSCH transmission is scheduled with SI-RNTI, MsgB-RNTI or RA-RNTI. The application delay of the change of the minimum scheduling offset restriction is determined in Section 5.3.1.<omitted text> |

|  |
| --- |
| (TS 38.214)6.1.2.1          Resource allocation in time domain<omitted text>When the UE configured with *minimumSchedulingOffsetK2* in an active UL BWP it applies a minimum scheduling offset restriction indicated by the ‘Minimum applicable scheduling offset indicator’ field in DCI format 0\_1 or DCI format 1\_1, if the same field is also available. When the UE configured with *minimumSchedulingOffsetK2* in an active UL BWP and it has not received ‘Minimum applicable scheduling offset indicator’ field in DCI format 0\_1 or 1\_1, the UE shall apply a minimum scheduling offset restriction indicated based on ‘Minimum applicable scheduling offset indicator’ value ‘0’. When the minimum scheduling offset restriction is applied the UE is not expected to be scheduled with a DCI in slot *n* to transmit a PUSCH scheduled with C-RNTI, CS-RNTI, MCS-C-RNTI or SP-CSI-RNTI with *K*2 smaller than, where *K*2min and are the applied minimum scheduling offset restriction and the numerology of the active UL BWP of the scheduled cell when receiving the DCI in slot *n*, respectively, and is the numerology of the new active UL BWP in case of active UL BWP change in the scheduled cell and is equal to , otherwise. The minimum scheduling restriction is not applied when PUSCH transmission is scheduled by RAR UL grant for RACH procedure, or when PUSCH is scheduled with TC-RNTI. The application delay of the change of the minimum scheduling offset restriction is determined in Section 5.3.1.<omitted text> |

During TP discussion phase, two additional TPs are added for

* Clarifying not both of K0min and K2min are always determined when UE receives DCI format 1\_1 or 1\_0 since there may be only one of active DL BWP and active UL BWP configured with restriction. TP4 is therefore added for Section 5.3.1 of TS 38.214.
* Elimination of “*minimumSchedulingOffset*” in Section 5.2.1.5.1 of TS 38.214 so that TP5 is added to specify it to “*minimumSchedulingOffsetK0*” and “*minimumSchedulingOffsetK2*” for DL BWP and UL BWP, respectively.

After companies’ check, chairman finally approved the following five TPs, as can be checked in [22]:

* **TP1** to Section 7.3.1 of TS 38.212 (It is to clarify that ‘Minimum applicable scheduling offset indicator’ field appears only when the corresponding active DL/UL BWP is configured with restriction. For joint indication, clarification is added for the case only one of active DL BWP and active UL BWP is configured with restriction):

|  |
| --- |
| (TS 38.212)7.3.1.1.2               Format 0\_1<omitted text>-     Minimum applicable scheduling offset indicator – 0 or 1 bit -     0 bit if higher layer parameter*~~minimumSchedulingOffset~~ minimumSchedulingOffsetK2* is not configured;-     1 bit if higher layer parameter*~~minimumSchedulingOffset~~ minimumSchedulingOffsetK2* is configured. The 1 bit indication is used to determine the minimum applicable K~~0~~2 for the active ~~DL~~ UL BWP and the minimum applicable K~~2~~0 value for the active ~~UL~~ DL BWP, if configured respectively, according to Table 7.3.1.1.2-33. If the minimum applicable K0 is indicated, the minimum applicable value of the aperiodic CSI-RS triggering offset for an active DL BWP shall be the same as the minimum applicable K0 value. <omitted text>7.3.1.2.2               Format 1\_1<omitted text>-     Minimum applicable scheduling offset indicator – 0 or 1 bit -     0 bit if higher layer parameter*~~minimumSchedulingOffset~~ minimumSchedulingOffsetK0* is not configured;-     1 bit if higher layer parameter*~~minimumSchedulingOffset~~ minimumSchedulingOffsetK0* is configured. The 1 bit indication is used to determine the minimum applicable K0 for the active DL BWP and the minimum applicable K2 value for the active UL BWP, if configured respectively, according to Table 7.3.1.1.2-33. If the minimum applicable K0 is indicated, the minimum applicable value of the aperiodic CSI-RS triggering offset for an active DL BWP shall be the same as the minimum applicable K0 value.  <omitted text> |

* **TP2** to Section 5.1.2.1 of TS 38.214 (Added clarification for that active UL BWP may not be configured with restriction):

|  |
| --- |
| (TS 38.214)5.1.2.1          Resource allocation in time domain<omitted text>When the UE is configured with *minimumSchedulingOffsetK0* in an active DL BWP it applies a minimum scheduling offset restriction indicated by the ‘Minimum applicable scheduling offset indicator’field in DCI format ~~0~~1\_1 or DCI format 0~~1~~\_1 if the same field is available. When the UE is configured with *minimumSchedulingOffsetK0* in an active DL BWP and it has not received ‘Minimum applicable scheduling offset indicator’ field in DCI format 0\_1 or 1\_1, the UE shall apply a minimum scheduling offset restriction indicated based on ‘Minimum applicable scheduling offset indicator’ value ‘0’. When the minimum scheduling offset restriction is applied the UE is not expected to be scheduled with a DCI in slot *n* to receive a PDSCH scheduled with C-RNTI, CS-RNTI or MCS-C-RNTI with *K*0 smaller than, where *K*0minand are the applied minimum scheduling offset restriction and the numerology of the active DL BWP of the scheduled cell when receiving the DCI in slot *n,* respectively, and is the numerology of the new active DL BWP in case of active DL BWP change in the scheduled cell and is equal to , otherwise. The minimum scheduling offset restriction is not applied when PDSCH transmission is scheduled with C-RNTI, CS-RNTI or MCS-C-RNTI in common search space associated with CORESET0 and default PDSCH time domain resource allocation is used, in the search space set provided by *recoverySearchSpaceId* when monitoring PDCCH as described in [6, TS 38.213] or when PDSCH transmission is scheduled with SI-RNTI, MsgB-RNTI or RA-RNTI. The application delay of the change of the minimum scheduling offset restriction is determined in Section 5.3.1.<omitted text> |

* **TP3** to Section 6.1.2.1 of TS 38.214 (Added clarification for that active DL BWP may not be configured with restriction):

|  |
| --- |
| (TS 38.214)6.1.2.1          Resource allocation in time domain<omitted text>When the UE is configured with *minimumSchedulingOffsetK2* in an active UL BWP it applies a minimum scheduling offset restriction indicated by the ‘Minimum applicable scheduling offset indicator’ field in DCI format 0\_1 or DCI format 1\_1 if the same field is available. When the UE configured with *minimumSchedulingOffsetK2* in an active UL BWP and it has not received ‘Minimum applicable scheduling offset indicator’ field in DCI format 0\_1 or 1\_1, the UE shall apply a minimum scheduling offset restriction indicated based on ‘Minimum applicable scheduling offset indicator’ value ‘0’. When the minimum scheduling offset restriction is applied the UE is not expected to be scheduled with a DCI in slot *n* to transmit a PUSCH scheduled with C-RNTI, CS-RNTI, MCS-C-RNTI or SP-CSI-RNTI with *K*2 smaller than, where *K*2min and are the applied minimum scheduling offset restriction and the numerology of the active UL BWP of the scheduled cell when receiving the DCI in slot *n*, respectively, and is the numerology of the new active UL BWP in case of active UL BWP change in the scheduled cell and is equal to , otherwise. The minimum scheduling restriction is not applied when PUSCH transmission is scheduled by RAR UL grant for RACH procedure, or when PUSCH is scheduled with TC-RNTI. The application delay of the change of the minimum scheduling offset restriction is determined in Section 5.3.1.<omitted text> |

* **TP4** to Section 5.3.1 of TS 38.214 (Added clarification for the case only one of active DL BWP and active UL BWP is configured with restriction):

|  |
| --- |
| 5.3.1       Application delay of the minimum scheduling offset restriction<omitted text>When the UE is scheduled with DCI format 0\_1 or 1\_1 with a ‘Minimum applicable scheduling offset indicator’field in slot *n*, it shall determine the *K*0min and *K*2min values, if configured respectively, to be applied, while the previously applied *K*0min and/or *K*2min values are applied until the new values take effect. If the DCI in slot *n* also indicates an active DL (UL) BWP change for a serving cell, the indicated *K*0min (*K*2min) value in the new active DL (UL) BWP, if configured, is applied from the slot indicated by the slot offset value of the time domain resource assignment field in the DCI. Otherwise, change of applied minimum scheduling offset restriction indication carried by DCI in slot *n*, shall be applied in slot *n*+*X* of the scheduling cell. The UE does not expect to be scheduled with DCI format 0\_1 or 1\_1 with ‘Minimum applicable scheduling offset indicator’ field indicating another change to the applied *K*0min and *K*2min for the same active BWP before slot *n+X* of the scheduling cell.When the DCI format 0\_1 or 1\_1 with [‘Minimum applicable scheduling offset indicator’**]** field indicating a change to the applied *K*0min or *K*2min is contained within the first three symbols of the slot, the value of application delay *X* is determined by, where  *K*0minOld is the currently applied *K*0min value of the active DL BWP in the scheduled cell and is zero, if *minimumSchedulingOffsetK0* is not configured for the active DL BWP in the scheduled cell.~~, and~~ *Zµ* is determined by the subcarrier spacing of the active DL BWP in the scheduling cell~~,~~ and given in Table 5.3.1-1, and *µ*PDCCH and *µ*PDSCH are the sub-carrier spacing configurations for PDCCH and PDSCH, respectively<omitted text> |

* **TP5** to Section 5.2.1.5.1 of TS 38.214 (Clarification to replace *minimumSchedulingOffset* by *minimumSchedulingOffsetK0* / *minimumSchedulingOffsetK2*):

|  |
| --- |
| 5.2.1.5.1              Aperiodic CSI Reporting/Aperiodic CSI-RS when the triggering PDCCH and the CSI-RS have the same numerology<omitted text>When aperiodic CSI-RS is used with aperiodic reporting, the CSI-RS offset is configured per resource set by the higher layer parameter *aperiodicTriggeringOffset*, including the case that the UE is not configured with *minimumSchedulingOffsetK0* for any DL BWP or *minimumSchedulingOffsetK2* for any UL BWP and all the associated trigger states do not have the higher layer parameter *qcl-Type* set to 'QCL-TypeD' in the corresponding TCI states. The CSI-RS triggering offset has the values of {0, 1, 2, 3, 4, 5, 6, …, 15, 16, 24} slots. If the UE is not configured with *minimumSchedulingOffsetK0* for any DL BWP or *minimumSchedulingOffsetK2* for any UL BWP and if all the associated trigger states do not have the higher layer parameter *qcl-Type* set to 'QCL-TypeD' in the corresponding TCI states , the CSI-RS triggering offset is fixed to zero. The aperiodic triggering offset of the CSI-IM follows offset of the associated NZP CSI-RS for channel measurement.<omitted text> |

# [101-e-NR-NR\_UE\_Pow\_Sav-Cross\_Slot-02] Email approval of confirmation of the working assumptions and the related TPs

In this section, email discussion according to the following chair’s approval will be recorded:

|  |
| --- |
| [101-e-NR-NR\_UE\_Pow\_Sav-Cross\_Slot-02] Email approval of confirmation of the working assumptions and the related TPs:* Topic 2-1: Discuss and decide the following clarifications for application delay in Section 5.3.1 of TS 38.214
	+ Clarifications for the determination of application delay, starting with the TP as in [R1-2004669](file:///C%3A%5CUsers%5Cwanshic%5COneDrive%20-%20Qualcomm%5CDocuments%5CStandards%5C3GPP%20Standards%5CMeeting%20Documents%5CTSGR1_101%5CDocs%5CR1-2004669.zip)
	+ For clarifying the application timing for cross-carrier scheduling case of a K0min/K2min change indicated by a cross-carrier scheduling that is before the DCI indicating active BWP change to a target BWP of different numerology in the scheduling cell, discuss and decide between explicit clarification and implicit clarification for the application timing and associated TP.
		- Example TP for explicit/implicit clarification as in [R1-2004669](file:///C%3A%5CUsers%5Cwanshic%5COneDrive%20-%20Qualcomm%5CDocuments%5CStandards%5C3GPP%20Standards%5CMeeting%20Documents%5CTSGR1_101%5CDocs%5CR1-2004669.zip)
* Topic 2-2: For clarification of Rel-16 UE assistance information for cross-slot scheduling, discuss and decide the following proposal:
	+ UE suggested values for minimumSchedulingOffsetK0 and minimumSchedulingOffsetK2 can also be applied to cross-carrier scheduling case.
		- Note: o Note: It is up to network how to consider other factors (e.g., delta values for cross-carrier scheduling, TS 38.214, Section 5.5) in addition to the UE suggested value in determining minimumSchedulingOffsetK0 or minimumSchedulingOffsetK2 for cross-carrier scheduling.
* Topic 2-3: Confirm a set of working assumptions as in [R1-2004669](file:///C%3A%5CUsers%5Cwanshic%5COneDrive%20-%20Qualcomm%5CDocuments%5CStandards%5C3GPP%20Standards%5CMeeting%20Documents%5CTSGR1_101%5CDocs%5CR1-2004669.zip)
 |

To facilitate the decision, the following phases are to be suggested:

* **Phase I (due 26th May 11 pm PST)**: Collection of companies views
* **Phase II (27th May 3 am PST –28th May 11 pm PST)**: Convergence on the proposal(s) (with potential initial TP(s), if agreed)
* **Phase III (1st June 3 am PST – 3rd June 11 pm PST)**: Convergence on the TP(s), if necessary from the agreed proposal(s)

Since there are three topics in the email thread, Section7.1, Section 7.2 and Section 7.3 will be devoted for Topic 2-1, Topic 2-2 and Topic 2-3, respectively.

## Topic 2-1: Discuss and Decide the Clarifications for Application Delay in Section 5.3.1 of TS 38.214

For the first clarification, companies are encouraged to provide views in Table 6 for the following initial TP:

|  |
| --- |
| 5.3.1 Application delay of the minimum scheduling offset restriction<omitted text>When the DCI format 0\_1 or 1\_1 with ~~[~~‘Minimum applicable scheduling offset indicator’~~]~~ field indicating a change to the applied *K*0min or *K*2min is contained within the first three symbols of the slot, the value of application delay *X* is determined by,where  *K*0minOld ~~is~~ and are the currently applied *K*0min value and the numerology of the active DL BWP in the scheduled cell, respectively, and is the numerology of the active DL BWP of the scheduling cell, and *Zµ* is determined by the subcarrier spacing of the active DL BWP in the scheduling cell, and given in Table 5.3.1-1 ~~and~~ *~~µ~~*~~PDCCH~~ ~~and~~ *~~µ~~*~~PDSCH~~ ~~are the sub-carrier spacing configurations for PDCCH and PDSCH, respectively~~. If *K*0min value is not configured for the active DL BWP in the scheduled cell, *K*0minOld is assumed to take the value zero. When the DCI format 0\_1 or 1\_1 with ~~[~~‘Minimum applicable scheduling offset indicator’~~]~~ field is received outside the first ~~[~~three~~]~~ symbols of the slot, value of *Zµ* from Table 5.3.1-1 is incremented by one before determining the application delay *X* by using the formula of DCI within the first three symbols of the slot.<omitted text> |

Table 6: Summary of companies' suggestions for the first clarification of Topic 2-1

|  |  |
| --- | --- |
| **Company** | **Suggestions for the above initial TP** |
| OPPO | We support the TP mostly. This text seems already covered “If *K*0min value is not configured for the active DL BWP in the scheduled cell, *K*0minOld is assumed to take the value zero”. In 5.1.2.1, “UE shall apply a minimum scheduling offset restriction indicated based on ['Minimum applicable scheduling offset indicator'] value '0'.” This already covered. What is the intention to introduce that? |
| ZTE | We agree with OPPO that the sentence of “If *K*0min value is not configured for the active DL BWP in the scheduled cell, *K*0minOld is assumed to take the value zero. ” seems redundant.If the *K*0min value is not configured for the active DL BWP, while the K2min is configured for the active UL BWP, the applied K0min will be zero, no matter the DL BWP is activated by DCI or timer, based on the proposed TP for Table 7.3.1.1.2-33( Joint indication of minimum applicable scheduling offset K0/K2) in Topic 1-2. |
| Samsung | We do not think the TP is needed.Regarding the clarification on “μPDCCH and μPDSCH”, we prefer to keep them as it is and not to change them to μscheduling and μscheduled, respectively, to maintain the consistency of the descriptions since μPDCCH and μPDSCH are already used across TS 38.214 .Regarding the clarification on “if K0min value is not configured, ~~”, we do not think this clarification is needed with the same reason mentioned by OPPO.Regarding the clarification on “by using the formula of DCI ~~”, we do not think this clarification is needed since the text is understandable without the corresponding clarified description.  |
| CMCC | We support the TP.Regarding the sentence of “If *K*0min value is not configured for the active DL BWP in the scheduled cell, *K*0minOld is assumed to take the value zero”. It is used in the case which *minimumSchedulingOffsetK0* is not configured in active DL BWP, and have no relationship with the sentence in 5.1.2.1, “UE shall apply a minimum scheduling offset restriction indicated based on ['Minimum applicable scheduling offset indicator'] value '0'.”, which is used to define UE’s default behaviour of not receiving the 1-bit indication in DCI.Therefore, in order to avoid the ambiguity, we suggest this sentence can be modified as” If *K*0min value is not configured for the active DL BWP in the scheduled cell, *K*0minOld=0” |
| Spreadtrum  | For the sentence of “If *K*0min value is not configured for the active DL BWP in the scheduled cell, *K*0minOld is assumed to take the value zero.” we share the same view with ZTE and OPPO. |
| Huawei, HiSilicon | We are generally fine with the TP to update the subscript of the SCS. Regarding the last sentence of ‘If *K*0min value is not configured for the active DL BWP in the scheduled cell, *K*0minOld is assumed to take the value zero.’, it may not be needed if we have some further agreements for topic 1-2. |
| MediaTek | Current TP looks good to us. But, for consensus, we are fine to remove the subscripts of “scheduling” and “scheduled”. |
| CATT | We don’t see the need of formula X change. The PDCCH and PDSCH numerology are clear. We only need to remove the bracket |
| InterDigital | We are fine with the proposed TP. |
| Nokia | For changing µPDCCH and µPDSCH naming, we don’t have a strong view, but this does not seem absolutely necessary. If it is seen that there is need to clarify the relation to corresponding BWPs (PDCCH and PDSCH) some clarification can be added e.g. “the sub-carrier spacing configurations for PDCCH and PDSCH, in corresponding active DL BWPs, respectively”.For clarifying the applied K0minOld when it has not been configured for the corresponding BWP we are not sure if this is needed. But we are fine to have this if it helps understanding.We don’t think that the clarification for the determination of X is needed.  |
| Qualcomm | We mostly support the TP. In the second paragraph, to make the description clearer, the following modification for the second paragraph in the TP may be considered:

|  |
| --- |
| When the DCI format 0\_1 or 1\_1 with ~~[~~‘Minimum applicable scheduling offset indicator’~~]~~ field is received outside the first ~~[~~three~~]~~ symbols of the slot, ~~value of~~ *~~Z~~~~µ~~* ~~from Table 5.3.1-1 is incremented by one before determining the application delay~~ *~~X~~* the value of application delay *X* is determined by *.* |

 |
| Intel | We do not think the change and TP is necessary and mostly concur with the reasons mentioned above by OPPO, ZTE, Samsung |
| Sony | Changing “μPDCCH and μPDSCH”, to μscheduling and μscheduled, respectively doesn’t seem to provide clarification, it just uses different terminology.In terms of the clarification on “by using the formula of DCI ~~”, again this doesn’t seem to provide clarification over the current text. What does “the formula of DCI” actually refer to anyway? Presumably it refers to the formula “”, but that hasn’t previously been called a “formula of DCI”. Isn’t it “the formula for calculating the application delay, X”?Since the updated text doesn’t really clarify with respect to the text in the current spec, we are OK with not agreeing to these updates.  |
| NTT DOCOMO | We agree with CMCC, and we support the TP. |
| Ericsson | We prefer to keep existing mu’s using PDCCH and PDSCH with additional clarification as needed (as Nokia suggested).Regarding “K0minOld”, since there is no RRC parameter for configuration of “*K*0min value”, some rewording may be helpful - “*If higher layer parameter minimumSchedulingOffsetK0 is not configured for the active DL BWP in the scheduled cell, K0minOld is 0.”*We don’t see need to clarify the determination of X. |
| LG | The current spec. is clear enough, so we don’t think the TP is necessary. |
|  |  |

From the above companies’ feedbacks, additional clarifications are not of high consensus. For and , they are already utilized in TS 38.214, and it is fine to follow the convention. Additional clarification as suggested by Nokia looks compact and sufficient to clarify the case where the change indication to K0min is not by DL scheduling DCI. For clarifying when there is no K0min configured in the active DL BWP of the scheduled cell, this can be handled by Topic 1-2. For the determination of X for the case the change indication is not in the first three symbols, multiple companies think it is not necessary. By the above, the following initial TP are suggested for TP discussion phase:

Proposed agreement: Discuss and decision the following TP to Section 5.3.1 of TS 38.214 for clarification of when the change indication to K0min is not by DCI format 1\_1 that schedules a PDSCH and for removal of square brackets:

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 5.3.1 Application delay of the minimum scheduling offset restriction<omitted text>When the DCI format 0\_1 or 1\_1 with ~~[~~‘Minimum applicable scheduling offset indicator’**~~]~~** field indicating a change to the applied *K*0min or *K*2min is contained within the first three symbols of the slot, the value of application delay *X* is determined by, where *K*0minOld is the currently applied *K*0min value of the active DL BWP in the scheduled cell, and *Zµ* is determined by the subcarrier spacing of the active DL BWP in the scheduling cell, and given in Table 5.3.1-1 and *µ*PDCCH and *µ*PDSCH are the sub-carrier spacing configurations for PDCCH and PDSCH in the active DL BWPs of the scheduling and scheduled cells, respectively When the DCI format 0\_1 or 1\_1 with ~~[~~‘Minimum applicable scheduling offset indicator’**~~]~~** field is received outside the first ~~[~~three~~]~~ symbols of the slot, value of *Zµ* from Table 5.3.1-1 is incremented by one before determining the application delay *X*.Table 5.3.1-1: Definition of *Zµ*

|  |  |
| --- | --- |
| *µ* | *Zµ* |
| 0 | 1 |
| 1 | 1 |
| 2 | 2 |
| 3 | 2 |

<omitted text> |

**Since the discussion for Topic 2-1 takes too much time, the above TP is finally merged with the TP for the second clarification for chairman’s joint approval, as can be checked in [23].**

For the second clarification, it a follow-up topic of RAN1 #100-Bis-e, and companies can check **Section** 2 for the summary of views from companies’ contributions. For deciding explicit or implicit clarification, the following are two corresponding example TPs:

* + - For clarifying the application timing for cross-carrier scheduling case of a K0min/K2min change indicated by a cross-carrier scheduling that is before the DCI indicating active BWP change to a target BWP of different numerology in the scheduling cell, discuss and decide between explicit clarification and implicit clarification for the application timing and associated TP.
			* Example TP for explicit clarification is as follows:

|  |
| --- |
| 5.3.1 Application delay of the minimum scheduling offset restriction<omitted text>When the UE is scheduled with DCI format 0\_1 or 1\_1 with a ‘Minimum applicable scheduling offset indicator’field in slot *n*, it shall determine the *K*0min and *K*2min values to be applied, while the previously applied *K*0min and *K*2min values are applied until the new values take effect. If the DCI in slot *n* also indicates an active DL (UL) BWP change for a serving cell, the indicated *K*0min (*K*2min) value in the new active DL (UL) BWP, if configured, is applied from the slot indicated by the slot offset value of the time domain resource assignment field in the DCI. Otherwise, change of applied minimum scheduling offset restriction indication carried by DCI in slot *n*, shall be applied in slot *n*+*X* of the scheduling cell. The UE does not expect to be scheduled with DCI format 0\_1 or 1\_1 with ‘Minimum applicable scheduling offset indicator’ field indicating another change to the applied *K*0min and *K*2min for the same active BWP before slot *n+X* of the scheduling cell. If there is active DL BWP change in the scheduling cell after a change indication to a scheduled cell by cross-carrier scheduling in slot *n*, the application delay is converted as where is the numerology of the active DL BWP of the scheduling cell when sending the change indication in slot *n*, and is the numerology of the new active DL BWP of the scheduling cell.<omitted text> |

* + - * Example TP for implicit clarification is as follows:

|  |
| --- |
| < Unchanged parts are omitted >5.3.1   Application delay of the minimum scheduling offset restrictionWhen the UE is scheduled with DCI format 0\_1 or 1\_1 with a ‘Minimum applicable scheduling offset indicator’field in slot *n*, it shall determine the *K*0min and *K*2min values to be applied, while the previously applied *K*0min and *K*2min values are applied until the new values take effect. If the DCI in slot *n* also indicates an active DL (UL) BWP change for a serving cell, the indicated *K*0min (*K*2min) value in the new active DL (UL) BWP, if configured, is applied from the slot indicated by the slot offset value of the time domain resource assignment field in the DCI. Otherwise, change of applied minimum scheduling offset restriction indication carried by DCI in slot *n*, shall be applied in slot *n*+*X* of the scheduling cell. The UE does not expect to be scheduled with DCI format 0\_1 or 1\_1 with ‘Minimum applicable scheduling offset indicator’ field indicating another change to the applied *K*0min and *K*2min for the same active BWP before slot *n+X* of the scheduling cell.When the DCI format 0\_1 or 1\_1 with [‘Minimum applicable scheduling offset indicator’**]** field indicating a change to the applied *K*0min or *K*2min is contained within the first three symbols of ~~the~~ slot *n*, the value of application delay *X* is determined by, where  *K*0minOld is the currently applied *K*0min value of the active DL BWP in the scheduled cell, and *Zµ* is determined by the subcarrier spacing of the active DL BWP in the scheduling cell in slot *n*, and given in Table 5.3.1-1 and *µ*PDCCH and *µ*PDSCH are the sub-carrier spacing configurations for PDCCH in slot *n* and PDSCH, respectively< Unchanged parts are omitted > |

In Table 7, companies are encourage to provide selection of explicit/implicit clarification and suggestions for the corresponding initial TP:

Table 7: Summary of companies' views for explicit or implicit 2nd clarification of Topic 2-1

|  |  |  |
| --- | --- | --- |
| **Company** | **Selection (Explicit or implicit clarification)** | **Suggestion for the initial TP of the suggested clarification** |
| OPPO | Both are OK for us. We do not see the need to categorize implicit or explicit. | “‘Minimum applicable scheduling offset indicator’ field indicating another change to the applied *K*0min and *K*2min for the same active BWP before time of slot *n+X* of the scheduling cell assuming SCS of the scheduling PDCCH”.”We are also OK with Samsung or Huawei’s TP. |
| ZTE | **Explicit clarification** | Similar with the subclause 5.1.2.1(copied as below), the numerology conversion needs to be applied to (n+X).

|  |
| --- |
| ----5.1.2.1 Resource allocation in time domain in 38.214 g10--Given the parameter values of the indexed row:- The slot allocated for the PDSCH is *Ks*, where , if UE is configured with *CA-slot-offset* for at least one of the scheduled and scheduling cell, and *Ks* = , otherwise, and where *n* is the slot with the scheduling DCI, and *K0* is based on the numerology of PDSCH, and  and are the subcarrier spacing configurations for PDSCH and PDCCH, respectively |

 |
| Samsung | Implicit clarification | We do not agree with such a redundant explicit clarification that makes the specification more complicated. We are OK with TPs from OPPO, [5], or [9]. |
| CMCC | We are ok for both explicit or implicit clarification | If explicit clarification is adopted, we has the similar view as ZTE, which the slot n should also be converted as the numerology conversion of PDSCH/PUSCH scheduling.We suggest the following TP:5.3.1 Application delay of the minimum scheduling offset restriction<omitted text>When the UE is scheduled with DCI format 0\_1 or 1\_1 with a ‘Minimum applicable scheduling offset indicator’field in slot *n*, it shall determine the *K*0min and *K*2min values to be applied, while the previously applied *K*0min and *K*2min values are applied until the new values take effect. If the DCI in slot *n* also indicates an active DL (UL) BWP change for a serving cell, the indicated *K*0min (*K*2min) value in the new active DL (UL) BWP, if configured, is applied from the slot indicated by the slot offset value of the time domain resource assignment field in the DCI. Otherwise, change of applied minimum scheduling offset restriction indication carried by DCI in slot *n*, shall be applied in slot *n*+*X* of the scheduling cell. The UE does not expect to be scheduled with DCI format 0\_1 or 1\_1 with ‘Minimum applicable scheduling offset indicator’ field indicating another change to the applied *K*0min and *K*2min for the same active BWP before slot *n+X* of the scheduling cell. If there is active DL BWP change in the scheduling cell after a change indication to a scheduled cell by cross-carrier scheduling in slot *n*, change of applied minimum scheduling offset restriction indication shall be applied in slot of the scheduling cell, where is the numerology of the active DL BWP of the scheduling cell when sending the change indication in slot *n*, and is the numerology of the new active DL BWP of the scheduling cell. |
| Spreadtrum | Explicit clarification | Actually, we don't have strong view on this, both are OK for us. But from the perspective of spec reading, explicit clarification is a friendlier way. |
| Huawei, HiSilicon | Implicit clarification | The numerology conversion for this case is not needed, and the UE knows the time when the indicated K0min/K2min should take effect. We are OK with the TP provided by the Moderator for the implicit clarification. |
| MediaTek | Explicit clarification | Cross-carrier scheduling and cross-slot scheduling are both enhanced in Rel-16, and it is beneficial to clarify the interaction of the two features. Explicit clarification with conversion on (n+X) is suggested to avoid the confusion only part of the application timing is converted. Since n is also covered in other section of 38.214, as quoted in ZTE reply, there should be no issue to covert (n+X). |
| Panasonic | Both are okay to us. But more preferable with explicit clarification  |  |
| CATT | Implicit clarification |  |
| Qualcomm | Explicit clarification | Explicit numerology conversion is a common practice widely used throughout the specification. Therefore, to make the description clearer, we think explicit clarification is needed. The following TP may be considered:The UE does not expect to be scheduled with DCI format 0\_1 or 1\_1 with ‘Minimum applicable scheduling offset indicator’ field indicating another change to the applied *K*0min and *K*2min for the same active BWP of the scheduled cell before slot *n+X* of the scheduling cell. If there is an active DL BWP change(s) in the scheduling cell after indicating a change to the applied *K*0min and *K*2min by cross-carrier scheduling in slot n, the slot *n*+*X* is converted to , where is the numerology of the active DL BWP of the scheduling cell when sending the DCI in slot *n*, and is the numerology of the new active BWP of the scheduling cell when the indicated change is applied. |
| Intel | Explicit clarification | It is necessary to clearly identify which slot in new active DL BWP of scheduling cell the change indication is applied. Implicit clarification does not seem to provide any information in this regard because there can be a numerology change triggered by another DCI received after slot n.We agree that conversion to n+X needs to be applied, not X. However, converted (n+X) may not accurately provide the slot index in new active DL BWP where change indication will be applied/effective. This is because UE does not expect to receive anything after change of BWP and before PDSCH is delivered in new BWP and it is possible that converted (n+X) may indicate a slot in that duration. **Hence, to make the description clear in specification, we suggest to identify exactly which slot the change indication is applied and it depends on the value of K0 indicated by the DCI providing active BWP change in scheduling cell.** To this end, we have the following proposal which makes it clear which slot change indication is applied.**If a cross-carrier scheduling DCI in slot *n* indicates change of *K0min* and/or *K2min* in scheduled cell and another DCI received in slot *n1* , where *n1* > *n*, triggers active DL BWP change in the scheduling cell, then the change of *K*0min and/or *K*2min in scheduled cell would be applied in slot if > , otherwise in slot in the new active DL BWP of the scheduling cell. Here,**  **is the numerology of the active DL BWP of the scheduling cell when receiving the DCI in slot n, and is the numerology of the new active DL BWP.*** **Note: This is applicable when slot index *n+X* indicates a time after active BWP change in scheduling cell.**
 |
| Sony | Implicit clarification | We would also be OK with explicit clarification, but we think that the current “explicit clarification” text doesn’t really clarify things. In particular, the following text is confusing: “a change indication to a scheduled cell”.What sort of “change indication” is the text referring to? That paragraph talks about (1) “active DL (UL) BWP change for a serving cell” and (2) “change of applied minimum scheduling offset restriction indication carried by DCI in slot *n*”. Hence if we the spec talks about “change indication”, it seems ambiguous whether we are talking about (1) a BWP change or (2) a K0min change. It’s not really clear what “a scheduled cell” refers to either.If we go down the route of explicit indication, can we please spend some further time refining the text proposal (with some figures in the discussion phase)? |
| NTT DOCOMO | Both are okay for us |  |
| Ericsson | Explicit clarification preferable |  |
| LG | Both are okay |  |
| Nokia | Explicit clarification |  |

By the above summary, there are 5 companies supporting implicit clarification (CATT clarified their support during email discussion), 7 companies supporting explicit clarification (Nokia indicated their support during email discussion), and 5 companies can support both types of clarification.

|  |  |
| --- | --- |
| Explicit clarification (7) | ZTE, Spreadtrum, MediaTek, Qualcomm, Intel, Ericsson, Nokia |
| Implicit clarification (5) | Samsung, Huawei, HiSilicon, Sony, CATT |
| Either is fine (5) | OPPO, CMCC, Panasonic, DoCoMo, LG |

Regarding the TP, 5 companies suggest conversion on (n + X) instead X, and there is quoted text in TS 38.214 that convert the numerology of n, according to ZTE. Therefore, conversion on (n + X) is suggested for the TP. Regarding Intel’s proposal that the application time should correspond to a slot that is available for data scheduling, it is noticed that “K0min and/or K2min are applied” doesn’t require UE can be scheduled with data, as can be checked in the following quoted specification texts:

|  |
| --- |
| (Section 5.1.2.1 of TS 38.214)… When the minimum scheduling offset restriction is applied the UE is not expected to be scheduled with a DCI in slot *n* to receive a PDSCH scheduled with C-RNTI, CS-RNTI or MCS-C-RNTI with *K*0 smaller than … |
| (Section 6.1.2.1 of TS 38.214)… When the minimum scheduling offset restriction is applied the UE is not expected to be scheduled with a DCI in slot *n* to transmit a PUSCH scheduled with C-RNTI, CS-RNTI, MCS-C-RNTI or SP-CSI-RNTI with *K*2 smaller than … |

In this regard, the group finally agree to clarify the first slot in which the new K0min and/or K2min values are applied but do not have consensus on whether to further clarify when UE can be scheduled with the new K0min and/or K2min values after active BWP change in the scheduling cell. With this status captured as a note and further integrate the TP for the first clarification, the following agreements and TP finally gain the group’s consensus and are approved by chairman, as can be checked in [23]:

Agreements

Include the following TP to Section 5.3.1 of TS 38.214 for

* Clarification of the reference numerology for the application delay
* Clarification of the application time for the K0min or K2min change in the scheduled cell indicated by cross-carrier scheduling that is before a DCI indicating active BWP change to a target BWP of different numerology in the scheduling cell
	+ RAN1 agree to clarify the first slot in which the new K0min and/or K2min values are applied but do not have consensus on whether to further clarify when UE can be scheduled with the new K0min and/or K2min values after active BWP change in the scheduling cell.
* Editorial changes, including removal of the square brackets

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 5.3.1       Application delay of the minimum scheduling offset restriction<omitted text>When the UE is scheduled with DCI format 0\_1 or 1\_1 with a ‘Minimum applicable scheduling offset indicator’field in slot *n*, it shall determine the *K*0min and *K*2min values to be applied, while the previously applied *K*0min and *K*2min values are applied until the new values take effect. If the DCI in slot *n* also indicates an active DL (UL) BWP change for a serving cell, the indicated *K*0min (*K*2min) value in the new active DL (UL) BWP, if configured, is applied from the slot indicated by the slot offset value of the time domain resource assignment field in the DCI. Otherwise, change of applied minimum scheduling offset restriction indication carried by DCI in slot *n*, shall be applied in slot *n*+*X* of the scheduling cell. The UE does not expect to be scheduled with DCI format 0\_1 or 1\_1 with ‘Minimum applicable scheduling offset indicator’ field indicating another change to ~~the applied~~ *K*0min ~~and~~ or *K*2min for the same active BWP of the scheduled cell before slot *n+X* of the scheduling cell.When the DCI format 0\_1 or 1\_1 with ~~[~~‘Minimum applicable scheduling offset indicator’**~~]~~** field indicating a change to the applied *K*0min or *K*2min is contained within the first three symbols of ~~the~~ slot *n*, the value of application delay *X* is determined by, where  *K*0minOld is the currently applied *K*0min value of the active DL BWP in the scheduled cell, and *Zµ* is determined by the subcarrier spacing of the active DL BWP in the scheduling cell in slot *n*, and given in Table 5.3.1-1 and *µ*PDCCH and *µ*PDSCH are the sub-carrier spacing configurations for PDCCH of the active DL BWP in the scheduling cell and PDSCH of the active DL BWP in the scheduled cell, respectively, in slot *n*. After indication of a change to the applied *K*0min or *K*2min of the scheduled cell in slot *n* of the scheduling cell, if there is an active DL BWP change in the scheduling cell before slot *n+X*, the new *K*0min and/or *K*2min values are applied from the first slot no earlier than the start of slot *n*+*X* based on the sub-carrier spacing configuration of the active DL BWP in the scheduling cell in slot n.When the DCI format 0\_1 or 1\_1 with ~~[~~‘Minimum applicable scheduling offset indicator’**~~]~~** field is received outside the first ~~[~~three~~]~~ symbols of the slot, value of *Zµ* from Table 5.3.1-1 is incremented by one before determining the application delay *X*.**Table 5.3.1-1: Definition of *Zµ***

|  |  |
| --- | --- |
| ***µ*** | ***Zµ*** |
| 0 | 1 |
| 1 | 1 |
| 2 | 2 |
| 3 | 2 |

<omitted text> |

## Topic 2-2: Clarification of Rel-16 UE Assistance Information for Cross-Slot Scheduling

For this topic, the target is to discuss and decide (with potential revision) the following proposal:

|  |
| --- |
| Proposal: UE suggested values for minimumSchedulingOffsetK0 and minimumSchedulingOffsetK2 can also be applied to cross-carrier scheduling case.* Note: It is up to network how to consider other factors (e.g., delta values for cross-carrier scheduling, TS 38.214, Section 5.5) in addition to the UE suggested value in determining minimumSchedulingOffsetK0 or minimumSchedulingOffsetK2 for cross-carrier scheduling.
 |

In Table 8, companies are encouraged to provide views/suggestions for the above proposal:

Table 8: Summary of companies' views/suggestions on the proposal for Topic 2-2

|  |  |
| --- | --- |
| **Company** | **View/suggestion on the proposal** |
| OPPO | We accept the conclusion. The value can be actually used by cross-slot. |
| ZTE | Okay with the FL proposal. |
| Samsung | We are OK with the FL’s proposal. |
| CMCC | Support the FL proposal |
| Spreadtrum | We are fine with the FL’s proposal |
| Huawei, HiSilicon | We are OK with Moderator’s proposal. Actually, we think it is a gNB implementation. |
| MediaTek | This can be an agreed conclusion without specification change. |
| Panasonic | The proposal is okay with us without specification impact. |
| CATT | We are OK with the proposal |
| InterDigital | We are ok with this proposal. |
| Nokia | We are also fine with the FL’s proposal. |
| Qualcomm | We support the proposal in general. However, since the UAI for ‘minSchedulingOffsetPreference-r16’ in the current RAN2 specification is per UE signalling, it may need further discussion on how the suggested values could be used differently for same and cross-carrier scheduling. For example, when the SCS of the scheduling cell is smaller than that of the scheduled cell, a larger K0min/K2min value may be needed, compared to the same-carrier scheduling. Thus, the network may add an additional offset to the UE suggested value (like the delta values in Section 5.5, TS 38.214 or the ‘d’ value in Section 5.2.1.5.1a-1, TS 38.214) to determine K0min/K2min for cross-carrier scheduling. |
| Intel | Support the FL proposal |
| Sony | We are OK with the proposal. This seems like a gNB implementation issue. |
| NTT DOCOMO | We are fine with the FL proposal. |
| Ericsson | OK with FL proposal. |
| LG | OK with FL proposal |
| Apple | OK |
|  |  |

By the above summary, all companies are supportive to the proposal. After the email discussion phase, chairman also approved the proposal as a conclusion, as can be check in [24]:

Conclusion

UE suggested values for minimumSchedulingOffsetK0 and minimumSchedulingOffsetK2 can also be applied to cross-carrier scheduling case.

* Note: It is up to network how to consider other factors (e.g., delta values for cross-carrier scheduling, TS 38.214, Section 5.5) in addition to the UE suggested value in determining minimumSchedulingOffsetK0 or minimumSchedulingOffsetK2 for cross-carrier scheduling.

## Topic 2-3: Confirm Working Assumptions for Rel-16 Cross-Slot Scheduling Procedures

For the topic, the following working assumptions are to be confirmed:

|  |
| --- |
| Agreements (RAN1 #99):For PDCCH monitoring case 1-1 for Cross-carrier scheduling, the application delay of cross-slot scheduling adaptation, denoted by X slot(s) for the scheduling cell, is determined by* X = max(Y, Z)
* Z is determined by the SCS of the active DL BWP of the scheduling cell and takes value of 1/1/2/2 slot(s) for DL SCS of 15/30/60/120 KHz, respectively
* Y is determined as one of the following alternatives:
* (working assumption) ceiling(minK0,scheduled\*2^scheudling/2^scheudled), where minK0,scheduled the minimum applicable K0 value of the active DL BWP of the scheduled cell prior to the change indication for the scheduled cell, scheudling and scheudled are the SCS indices for the scheduling cell and the scheduled cell, respectively.
 |
| Agreement (RAN1 #100b-e):For DCI scheduling PDSCH or PUSCH and indicating active BWP change,* (Working assumption) K0/K2 is no smaller than max(K0min/K2min of source BWP, BWP switch delay)
	+ Numerology conversion is applied to K0min/K2min in case of numerology change between target BWP and source BWP.
* The indicated K0min/K2min of target BWP is always applied starting from the slot of PDSCH or PUSCH scheduled by the DCI
* Clarify the application timing of a K0min/K2min change indicated by a cross-carrier scheduling that is before the DCI indicating active BWP change to a target BWP of different numerology in the scheduling cell.
 |
| Agreements (RAN1 #100b-e):* The minimum scheduling offset restriction is not applied when PDSCH transmission is scheduled with MsgB-RNTI.
* (Working assumption) The minimum scheduling offset restriction is not applied when PDSCH transmission is scheduled with C-RNTI or MCS-C-RNTI in the search space set provided by recoverySearchSpaceId when monitoring PDCCH as described in Section 6 [38.213].
 |

Since a working assumption can be reverted if there identified significant issue, companies are encouraged to provide views in Table 9, including revert or confirm the above working assumptions and significant issue identified, if any.

Table 9: Summary of companies' views for reverting or conforming working assumptions

|  |  |  |
| --- | --- | --- |
| **Company** | **Revert or confirm** | **Reason(s) (including the significant issue for reverting a WA)** |
| OPPO | Confirm the 3 WAs. |  |
| ZTE | Confirm the WA |  |
| Samsung | Confirm the WAs  |  |
| CMCC | Confirm the WAs |  |
| Spreadtrum | Confirm the above WAs |  |
| Huawei, HiSilicon | Confirm the WAs |  |
| MediaTek  | Confirm the WAs |  |
| Panasonic | Confirm the WAs |  |
| CATT | Confirm the WAs |  |
| InterDigital | Confirm the WAs. |  |
| Nokia | Confirm the WAs |  |
| Qualcomm | Confirm the WAs |  |
| Intel | Confirm first and third WA | There were concerns raised during 100b-e on second WA whether proposal can result in higher power saving gain than what Rel15 procedure offers, at the expense of some flexibility loss in TDRA design. We have provided references from Section 5.1.2 of TR38.840 that *“When minimum K0>1, the power saving gain decreases and UPT degrades as the K0 increases”* which makes power saving gain from proposal in WA questionable. We would appreciate if proponents or FL can provide some updates to this. In our view, it is necessary to justify power saving gain before we confirm WA.  |
| Sony | Confirm the WAs |  |
| NTT DOCOMO | Confirm the WAs |  |
| Ericsson | Confirm the WAs |  |
| LG | Confirm the WAs |  |
| Apple | Confirm the WAs |  |
|  |  |  |

From the above summary, there are 17 out of 18 companies supporting to confirm the three working assumptions. For 2nd working assumption, although the conclusion in TR 38.840 captures “*When minimum K0>1, the power saving gain* ***decreases***”, majority of the companies still think the remaining power saving gain is beneficial. In this regard, it is suggested to confirm all the three working assumptions. After further email discussion, Intel can accept confirming the 2nd work assumption for the sake of progress, therefore chairman finally approved the following agreement, as can be check in [24]:

Agreement

The following working assumptions are confirmed:

|  |
| --- |
| Agreements (RAN1 #99):For PDCCH monitoring case 1-1 for Cross-carrier scheduling, the application delay of cross-slot scheduling adaptation, denoted by X slot(s) for the scheduling cell, is determined by* X = max(Y, Z)
* Z is determined by the SCS of the active DL BWP of the scheduling cell and takes value of 1/1/2/2 slot(s) for DL SCS of 15/30/60/120 KHz, respectively
* Y is determined as one of the following alternatives:
* (working assumption) ceiling(minK0,scheduled\*2^scheudling/2^scheudled), where minK0,scheduled the minimum applicable K0 value of the active DL BWP of the scheduled cell prior to the change indication for the scheduled cell, scheudling and scheudled are the SCS indices for the scheduling cell and the scheduled cell, respectively.
 |
| Agreement (RAN1 #100b-e):For DCI scheduling PDSCH or PUSCH and indicating active BWP change,* (Working assumption) K0/K2 is no smaller than max(K0min/K2min of source BWP, BWP switch delay)
	+ Numerology conversion is applied to K0min/K2min in case of numerology change between target BWP and source BWP.
* The indicated K0min/K2min of target BWP is always applied starting from the slot of PDSCH or PUSCH scheduled by the DCI
* Clarify the application timing of a K0min/K2min change indicated by a cross-carrier scheduling that is before the DCI indicating active BWP change to a target BWP of different numerology in the scheduling cell.
 |
| Agreements (RAN1 #100b-e):* The minimum scheduling offset restriction is not applied when PDSCH transmission is scheduled with MsgB-RNTI.
* (Working assumption) The minimum scheduling offset restriction is not applied when PDSCH transmission is scheduled with C-RNTI or MCS-C-RNTI in the search space set provided by recoverySearchSpaceId when monitoring PDCCH as described in Section 6 [38.213].
 |

# Summary of Email Discussion

For the first email thread, [101-e-NR-NR\_UE\_Pow\_Sav-Cross\_Slot-01] Email discussion/approval to resolve issues related to the 1-bit indication for Rel-16 cross-slot scheduling adaptation, we have the following summary:

**(Section 6.1) Topic 1-1: Error Handling when UE Detects an Invalid TDRA Entry from DCI Format 1\_0/0\_0**

Conclusion

RAN1 have no consensus in specifying additional UE behavior when UE receives an invalid TDRA entry from DCI format 1\_0/0\_0.

**(Section 6.2) Topic 1-2: Presence of ‘Minimum Applicable Scheduling Offset Indicator Field’ and Joint Indication**

For the changes to TS 38.212

|  |  |
| --- | --- |
| ***Reason for change:*** | Clarification for the presence of ‘Minimum Applicable Scheduling Offset Indicator’ field and joint Indication with the following:* ‘Minimum applicable scheduling offset indicator field’ is present in DCI format 1\_1 (0\_1) only when at least one value is configured by minimumSchedulingOffsetK0 (minimumSchedulingOffsetK2) for the active DL (UL) BWP
* Joint indication when only one of active DL BWP and active UL BWP is configured with scheduling offset restriction
 |
|  |  |
| ***Summary of change:*** | For Section 7.3.1 of TS 38.212, changes are added to clarify that ‘Minimum applicable scheduling offset indicator’ field appears only when the corresponding active DL/UL BWP is configured with restriction. For joint indication, clarification is added for the case only one of active DL BWP and active UL BWP is configured with restriction |
|  |  |
| ***Consequences if not approved:*** | gNodeB and UE would not be aligned in the precense of ‘Minimum Applicable Scheduling Offset Indicator’ field in DCI format 1\_1 or 1\_0 and the joint indication |

The TP to Section 5.3.1 of TS 38.212 is provided as follows:

|  |
| --- |
| (TS 38.212)7.3.1.1.2               Format 0\_1<omitted text>-     Minimum applicable scheduling offset indicator – 0 or 1 bit -     0 bit if higher layer parameter*~~minimumSchedulingOffset~~ minimumSchedulingOffsetK2* is not configured;-     1 bit if higher layer parameter*~~minimumSchedulingOffset~~ minimumSchedulingOffsetK2* is configured. The 1 bit indication is used to determine the minimum applicable K~~0~~2 for the active ~~DL~~ UL BWP and the minimum applicable K~~2~~0 value for the active ~~UL~~ DL BWP, if configured respectively, according to Table 7.3.1.1.2-33. If the minimum applicable K0 is indicated, the minimum applicable value of the aperiodic CSI-RS triggering offset for an active DL BWP shall be the same as the minimum applicable K0 value. <omitted text>7.3.1.2.2               Format 1\_1<omitted text>-     Minimum applicable scheduling offset indicator – 0 or 1 bit -     0 bit if higher layer parameter*~~minimumSchedulingOffset~~ minimumSchedulingOffsetK0* is not configured;-     1 bit if higher layer parameter*~~minimumSchedulingOffset~~ minimumSchedulingOffsetK0* is configured. The 1 bit indication is used to determine the minimum applicable K0 for the active DL BWP and the minimum applicable K2 value for the active UL BWP, if configured respectively, according to Table 7.3.1.1.2-33. If the minimum applicable K0 is indicated, the minimum applicable value of the aperiodic CSI-RS triggering offset for an active DL BWP shall be the same as the minimum applicable K0 value.  <omitted text> |

For the changes to TS 38.214:

|  |  |
| --- | --- |
| ***Reason for change:*** | Clarification for the presence of ‘Minimum Applicable Scheduling Offset Indicator’ field and joint Indication with the following:* ‘Minimum applicable scheduling offset indicator field’ is present in DCI format 1\_1 (0\_1) only when at least one value is configured by minimumSchedulingOffsetK0 (minimumSchedulingOffsetK2) for the active DL (UL) BWP
* Joint indication when only one of active DL BWP and active UL BWP is configured with scheduling offset restriction
 |
|  |  |
| ***Summary of change:*** | For Section 5.1.2.1, clarification is added for that active UL BWP may not be configured with restrictionFor Section 6.1.2.1, clarification is added for that active DL BWP may not be configured with restrictionFor Section 5.3.1, clarification is added for the case only one of active DL BWP and active UL BWP is configured with restrictionFinally, for Section 5.2.1.5.1 of TS 38.214, there includes editorial changes to replace *minimumSchedulingOffset* by *minimumSchedulingOffsetK0* / *minimumSchedulingOffsetK2* |
|  |  |
| ***Consequences if not approved:*** | gNodeB and UE would not be aligned in the precense of ‘Minimum Applicable Scheduling Offset Indicator’ field in DCI format 1\_1 or 1\_0 and the joint indication |

And the TPs for TS 38.214 are provided as follows:

|  |
| --- |
| (TS 38.214)5.1.2.1  Resource allocation in time domain<omitted text>When the UE is configured with *minimumSchedulingOffsetK0* in an active DL BWP it applies a minimum scheduling offset restriction indicated by the ‘Minimum applicable scheduling offset indicator’field in DCI format ~~0~~1\_1 or DCI format 0~~1~~\_1 if the same field is available. When the UE is configured with *minimumSchedulingOffsetK0* in an active DL BWP and it has not received ‘Minimum applicable scheduling offset indicator’ field in DCI format 0\_1 or 1\_1, the UE shall apply a minimum scheduling offset restriction indicated based on ‘Minimum applicable scheduling offset indicator’ value ‘0’. When the minimum scheduling offset restriction is applied the UE is not expected to be scheduled with a DCI in slot *n* to receive a PDSCH scheduled with C-RNTI, CS-RNTI or MCS-C-RNTI with *K*0 smaller than, where *K*0minand are the applied minimum scheduling offset restriction and the numerology of the active DL BWP of the scheduled cell when receiving the DCI in slot *n,* respectively, and is the numerology of the new active DL BWP in case of active DL BWP change in the scheduled cell and is equal to , otherwise. The minimum scheduling offset restriction is not applied when PDSCH transmission is scheduled with C-RNTI, CS-RNTI or MCS-C-RNTI in common search space associated with CORESET0 and default PDSCH time domain resource allocation is used, in the search space set provided by *recoverySearchSpaceId* when monitoring PDCCH as described in [6, TS 38.213] or when PDSCH transmission is scheduled with SI-RNTI, MsgB-RNTI or RA-RNTI. The application delay of the change of the minimum scheduling offset restriction is determined in Section 5.3.1.<omitted text> |

|  |
| --- |
| (TS 38.214)6.1.2.1 Resource allocation in time domain<omitted text>When the UE is configured with *minimumSchedulingOffsetK2* in an active UL BWP it applies a minimum scheduling offset restriction indicated by the ‘Minimum applicable scheduling offset indicator’ field in DCI format 0\_1 or DCI format 1\_1 if the same field is available. When the UE configured with *minimumSchedulingOffsetK2* in an active UL BWP and it has not received ‘Minimum applicable scheduling offset indicator’ field in DCI format 0\_1 or 1\_1, the UE shall apply a minimum scheduling offset restriction indicated based on ‘Minimum applicable scheduling offset indicator’ value ‘0’. When the minimum scheduling offset restriction is applied the UE is not expected to be scheduled with a DCI in slot *n* to transmit a PUSCH scheduled with C-RNTI, CS-RNTI, MCS-C-RNTI or SP-CSI-RNTI with *K*2 smaller than, where *K*2min and are the applied minimum scheduling offset restriction and the numerology of the active UL BWP of the scheduled cell when receiving the DCI in slot *n*, respectively, and is the numerology of the new active UL BWP in case of active UL BWP change in the scheduled cell and is equal to , otherwise. The minimum scheduling restriction is not applied when PUSCH transmission is scheduled by RAR UL grant for RACH procedure, or when PUSCH is scheduled with TC-RNTI. The application delay of the change of the minimum scheduling offset restriction is determined in Section 5.3.1.<omitted text> |

|  |
| --- |
| 5.3.1 Application delay of the minimum scheduling offset restriction<omitted text>When the UE is scheduled with DCI format 0\_1 or 1\_1 with a ‘Minimum applicable scheduling offset indicator’field in slot *n*, it shall determine the *K*0min and *K*2min values, if configured respectively, to be applied, while the previously applied *K*0min and/or *K*2min values are applied until the new values take effect. If the DCI in slot *n* also indicates an active DL (UL) BWP change for a serving cell, the indicated *K*0min (*K*2min) value in the new active DL (UL) BWP, if configured, is applied from the slot indicated by the slot offset value of the time domain resource assignment field in the DCI. Otherwise, change of applied minimum scheduling offset restriction indication carried by DCI in slot *n*, shall be applied in slot *n*+*X* of the scheduling cell. The UE does not expect to be scheduled with DCI format 0\_1 or 1\_1 with ‘Minimum applicable scheduling offset indicator’ field indicating another change to the applied *K*0min and *K*2min for the same active BWP before slot *n+X* of the scheduling cell.When the DCI format 0\_1 or 1\_1 with [‘Minimum applicable scheduling offset indicator’**]** field indicating a change to the applied *K*0min or *K*2min is contained within the first three symbols of the slot, the value of application delay *X* is determined by, where  *K*0minOld is the currently applied *K*0min value of the active DL BWP in the scheduled cell and is zero, if *minimumSchedulingOffsetK0* is not configured for the active DL BWP in the scheduled cell.~~, and~~ *Zµ* is determined by the subcarrier spacing of the active DL BWP in the scheduling cell~~,~~ and given in Table 5.3.1-1, and *µ*PDCCH and *µ*PDSCH are the sub-carrier spacing configurations for PDCCH and PDSCH, respectively<omitted text> |

|  |
| --- |
| 5.2.1.5.1 Aperiodic CSI Reporting/Aperiodic CSI-RS when the triggering PDCCH and the CSI-RS have the same numerology<omitted text>When aperiodic CSI-RS is used with aperiodic reporting, the CSI-RS offset is configured per resource set by the higher layer parameter *aperiodicTriggeringOffset*, including the case that the UE is not configured with *minimumSchedulingOffsetK0* for any DL BWP or *minimumSchedulingOffsetK2* for any UL BWP and all the associated trigger states do not have the higher layer parameter *qcl-Type* set to 'QCL-TypeD' in the corresponding TCI states. The CSI-RS triggering offset has the values of {0, 1, 2, 3, 4, 5, 6, …, 15, 16, 24} slots. If the UE is not configured with *minimumSchedulingOffsetK0* for any DL BWP or *minimumSchedulingOffsetK2* for any UL BWP and if all the associated trigger states do not have the higher layer parameter *qcl-Type* set to 'QCL-TypeD' in the corresponding TCI states , the CSI-RS triggering offset is fixed to zero. The aperiodic triggering offset of the CSI-IM follows offset of the associated NZP CSI-RS for channel measurement.<omitted text> |

**(Section 7.1) Topic 2-1: Discuss and Decide the Clarifications for Application Delay in Section 5.3.1 of TS 38.214**

For the changes to TS 38.214:

|  |  |
| --- | --- |
| ***Reason for change:*** | For Section 5.3.1 of TS 38.214, changes are included for* Clarification of the reference numerology for the application delay
* Clarification of the application time for the K0min or K2min change in the scheduled cell indicated by cross-carrier scheduling that is before a DCI indicating active BWP change to a target BWP of different numerology in the scheduling cell
	+ RAN1 agree to clarify the first slot in which the new K0min and/or K2min values are applied but do not have consensus on whether to further clarify when UE can be scheduled with the new K0min and/or K2min values after active BWP change in the scheduling cell.
* Editorial changes, including removal of the square brackets
 |
|  |  |
| ***Summary of change:*** | For Section 5.3.1 of TS 38.214, changes for the above clarifications are added |
|  |  |
| ***Consequences if not approved:*** | gNodeB and UE would not be aligned in the appliation time and the reference numerology for determining the application delay/time |

And the TP for TS 38.214 is provided as follows:

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 5.3.1       Application delay of the minimum scheduling offset restriction<omitted text>When the UE is scheduled with DCI format 0\_1 or 1\_1 with a ‘Minimum applicable scheduling offset indicator’field in slot *n*, it shall determine the *K*0min and *K*2min values to be applied, while the previously applied *K*0min and *K*2min values are applied until the new values take effect. If the DCI in slot *n* also indicates an active DL (UL) BWP change for a serving cell, the indicated *K*0min (*K*2min) value in the new active DL (UL) BWP, if configured, is applied from the slot indicated by the slot offset value of the time domain resource assignment field in the DCI. Otherwise, change of applied minimum scheduling offset restriction indication carried by DCI in slot *n*, shall be applied in slot *n*+*X* of the scheduling cell. The UE does not expect to be scheduled with DCI format 0\_1 or 1\_1 with ‘Minimum applicable scheduling offset indicator’ field indicating another change to ~~the applied~~ *K*0min ~~and~~ or *K*2min for the same active BWP of the scheduled cell before slot *n+X* of the scheduling cell.When the DCI format 0\_1 or 1\_1 with ~~[~~‘Minimum applicable scheduling offset indicator’**~~]~~** field indicating a change to the applied *K*0min or *K*2min is contained within the first three symbols of ~~the~~ slot *n*, the value of application delay *X* is determined by, where  *K*0minOld is the currently applied *K*0min value of the active DL BWP in the scheduled cell, and *Zµ* is determined by the subcarrier spacing of the active DL BWP in the scheduling cell in slot *n*, and given in Table 5.3.1-1 and *µ*PDCCH and *µ*PDSCH are the sub-carrier spacing configurations for PDCCH of the active DL BWP in the scheduling cell and PDSCH of the active DL BWP in the scheduled cell, respectively, in slot *n*. After indication of a change to the applied *K*0min or *K*2min of the scheduled cell in slot *n* of the scheduling cell, if there is an active DL BWP change in the scheduling cell before slot *n+X*, the new *K*0min and/or *K*2min values are applied from the first slot no earlier than the start of slot *n*+*X* based on the sub-carrier spacing configuration of the active DL BWP in the scheduling cell in slot n.When the DCI format 0\_1 or 1\_1 with ~~[~~‘Minimum applicable scheduling offset indicator’**~~]~~** field is received outside the first ~~[~~three~~]~~ symbols of the slot, value of *Zµ* from Table 5.3.1-1 is incremented by one before determining the application delay *X*.**Table 5.3.1-1: Definition of *Zµ***

|  |  |
| --- | --- |
| ***µ*** | ***Zµ*** |
| 0 | 1 |
| 1 | 1 |
| 2 | 2 |
| 3 | 2 |

<omitted text> |

**(Section 7.2) Topic 2-2: Clarification of Rel-16 UE Assistance Information for Cross-Slot Scheduling**

Conclusion

UE suggested values for minimumSchedulingOffsetK0 and minimumSchedulingOffsetK2 can also be applied to cross-carrier scheduling case.

* Note: It is up to network how to consider other factors (e.g., delta values for cross-carrier scheduling, TS 38.214, Section 5.5) in addition to the UE suggested value in determining minimumSchedulingOffsetK0 or minimumSchedulingOffsetK2 for cross-carrier scheduling.

**(Section 7.3) Topic 2-3: Confirm Working Assumptions for Rel-16 Cross-Slot Scheduling Procedures**

Agreement

The following working assumptions are confirmed:

|  |
| --- |
| Agreements (RAN1 #99):For PDCCH monitoring case 1-1 for Cross-carrier scheduling, the application delay of cross-slot scheduling adaptation, denoted by X slot(s) for the scheduling cell, is determined by* X = max(Y, Z)
* Z is determined by the SCS of the active DL BWP of the scheduling cell and takes value of 1/1/2/2 slot(s) for DL SCS of 15/30/60/120 KHz, respectively
* Y is determined as one of the following alternatives:
* (working assumption) ceiling(minK0,scheduled\*2^scheudling/2^scheudled), where minK0,scheduled the minimum applicable K0 value of the active DL BWP of the scheduled cell prior to the change indication for the scheduled cell, scheudling and scheudled are the SCS indices for the scheduling cell and the scheduled cell, respectively.
 |
| Agreement (RAN1 #100b-e):For DCI scheduling PDSCH or PUSCH and indicating active BWP change,* (Working assumption) K0/K2 is no smaller than max(K0min/K2min of source BWP, BWP switch delay)
	+ Numerology conversion is applied to K0min/K2min in case of numerology change between target BWP and source BWP.
* The indicated K0min/K2min of target BWP is always applied starting from the slot of PDSCH or PUSCH scheduled by the DCI
* Clarify the application timing of a K0min/K2min change indicated by a cross-carrier scheduling that is before the DCI indicating active BWP change to a target BWP of different numerology in the scheduling cell.
 |
| Agreements (RAN1 #100b-e):* The minimum scheduling offset restriction is not applied when PDSCH transmission is scheduled with MsgB-RNTI.
* (Working assumption) The minimum scheduling offset restriction is not applied when PDSCH transmission is scheduled with C-RNTI or MCS-C-RNTI in the search space set provided by recoverySearchSpaceId when monitoring PDCCH as described in Section 6 [38.213].
 |

# References

1. “Draft Report of 3GPP TSG RAN WG1 #100bis-e v0.1.0”, on-line available @ <https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_100b_e/Report>
2. R1-2002763, “Summary#2 for Procedure of Cross-Slot Scheduling Power Saving Techniques”, MediaTek
3. R1-2003404, “Maintenance of procedure of cross-slot scheduling power saving techniques”, vivo
4. R1-2003487, “Remaining issues on cross-slot scheduling power saving techniques”, ZTE
5. R1-2003519, “Remaining issues on cross-slot scheduling based power saving”, Huawei, HiSilicon
6. R1-2003631, “Remaining issues on Power saving scheme with cross-slot scheduling”, CATT
7. R1-2003665, “Remaining issues on cross-slot scheduling adaptation”, MediaTek Inc.
8. R1-2003746, “Remaining details of cross-slot scheduling for power saving”, Intel Corporation
9. R1-2003885, “Remaining issues for cross-slot scheduling”, Samsung
10. R1-2003958, “Remaining issues on cross-slot scheduling procedure “, CMCC
11. R1-2003994, “Remaining issues on cross-slot scheduling”, Spreadtrum Communications
12. R1-2004026, “Remaining issues on procedure of cross-slot scheduling power saving techniques”, LG Electronics
13. R1-2004102, “Remaining issues for cross-slot scheduling”, OPPO
14. R1-2004187, “Remaining issues on cross-slot scheduling for UE power saving”, Sony
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16. R1-2004358, “Remaining issues for cross-slot scheduling”, Ericsson
17. R1-2004399, “Maintenance for procedure of cross-slot scheduling power saving techniques”, NTT DOCOMO, INC.
18. R1-2004468, “Remaining issues in cross-slot scheduling power saving”, Qualcomm Incorporated
19. R1-2004578, “Procedure of cross-slot scheduling power saving techniques”, Nokia
20. (Conclusion for Topic 1-1) “[101-e-NR-NR\_UE\_Pow\_Sav-Cross\_Slot-01] Email discussion to resolve issues related to the 1-bit indication for Rel-16 cross-slot scheduling adaptation”, online available @ <https://list.etsi.org/scripts/wa.exe?A2=ind2005E&L=3GPP_TSG_RAN_WG1&O=D&X=O99494A2B482DE6FFB9&Y=weide.wu%40mediatek.com&P=1200445>
21. (Agreements for Topic 1-2) “[101-e-NR-NR\_UE\_Pow\_Sav-Cross\_Slot-01] Email discussion to resolve issues related to the 1-bit indication for Rel-16 cross-slot scheduling adaptation”, online available @ <https://list.etsi.org/scripts/wa.exe?A2=ind2006A&L=3GPP_TSG_RAN_WG1&O=D&X=O99494A2B482DE6FFB9&Y=weide.wu%40mediatek.com&P=599756>
22. (Approved TP for Topic 1-2) “[101-e-NR-NR\_UE\_Pow\_Sav-Cross\_Slot-01] Email discussion to resolve issues related to the 1-bit indication for Rel-16 cross-slot scheduling adaptation”, online available @ <https://list.etsi.org/scripts/wa.exe?A2=ind2006A&L=3GPP_TSG_RAN_WG1&O=D&X=O99494A2B482DE6FFB9&Y=weide.wu%40mediatek.com&P=2155388>
23. (Agreements and approved TP for Topic 2-1) “[101-e-NR-NR\_UE\_Pow\_Sav-Cross\_Slot-02] Email discussion of application delay clarification and confirmation of WAs”, online available @ <https://list.etsi.org/scripts/wa.exe?A2=ind2006A&L=3GPP_TSG_RAN_WG1&O=D&X=O8588FF38BC13428A27&Y=weide.wu%40mediatek.com&P=2881412>
24. (Conclusion for Topic 2-2 and agreement for Topic 2-3) “[101-e-NR-NR\_UE\_Pow\_Sav-Cross\_Slot-02] Email discussion of application delay clarification and confirmation of WAs”, online available @ <https://list.etsi.org/scripts/wa.exe?A2=ind2005E&L=3GPP_TSG_RAN_WG1&O=D&X=O0A721D5A0FB2A074BE&Y=weide.wu%40mediatek.com&P=1209628>