**3GPP TSG RAN WG1 e-Meeting #101 R1-2004669**

**May 25th – June 5th, 2020**

Agenda Item: 7.2.7.2

Source: Moderator (MediaTek)

Title: Summary#1 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:

|  |
| --- |
| 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. |
| 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:

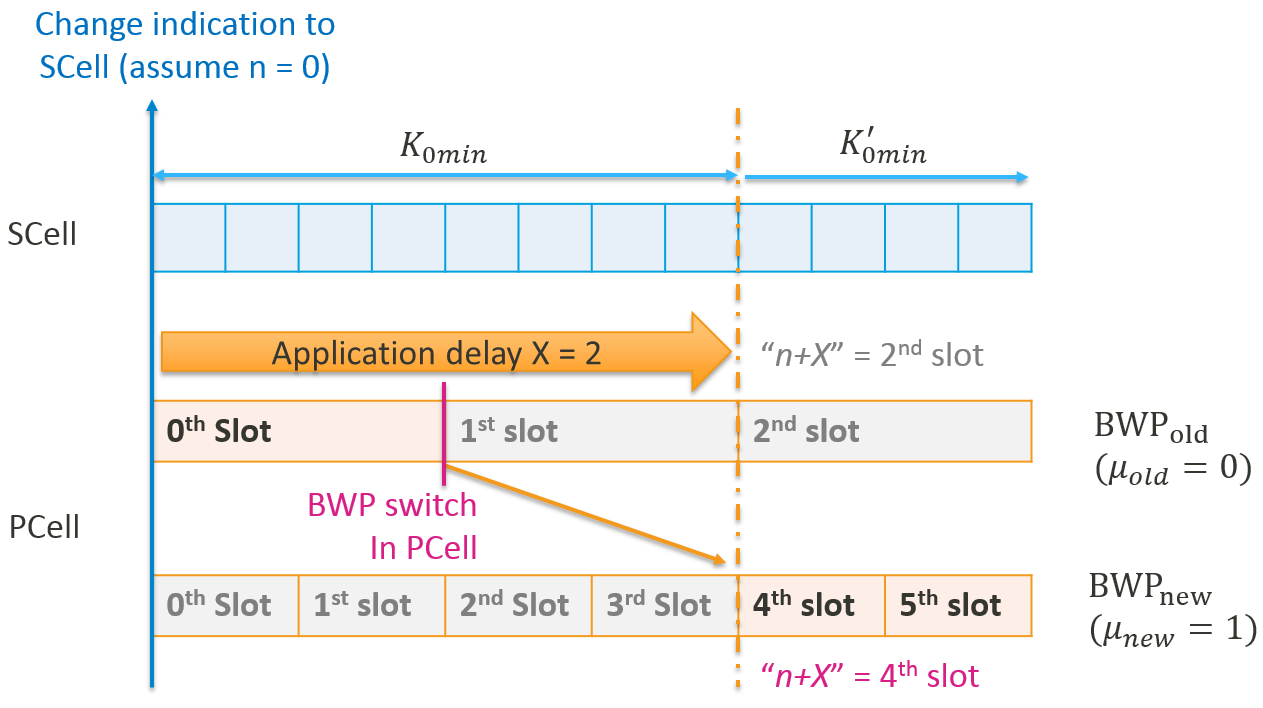


Figure 1: Illustration of the case for clarifying the application timing

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.

|  |
| --- |
| 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

|  |  |
| --- | --- |
| 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 restriction  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.  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:***   |  | | --- | | --------- 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 ---------------------------- | |
| MTK | Proposal 2: The following TP is incorporated to Section 5.3.1 of TS 38.214:   |  | | --- | | 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> | |
| 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.** |
| Samsung | **Proposed TP for TS 38.214 [2]**   |  | | --- | | 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 | |
| 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------------------------  ====================================================================== |
|  |  |

# Error Handling when Detecting Invalid TDRA entry from Fallback DCI

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

|  |
| --- |
| 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 |

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

|  |  |  |
| --- | --- | --- |
| 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 |
| 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]**   |  | | --- | | 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 ==================== | |
| 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* |

# 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.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 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.

|  |
| --- |
| 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 restriction  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.  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 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:   |  | | --- | | 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.**  |  | | --- | | 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 bit  The 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

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 |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

# 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
15. R1-2004307, “Remaining issues of cross-slot scheduling for UE power saving”, InterDigital
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, Nokia Shanghai Bell