**3GPP TSG RAN WG1 #106-e R1-210xxxx**

**e-Meeting, August 16th – 27th, 2021**

**Source: Moderator (ZTE)**

**Title: Moderator summary of [106-e-NR-MRDC-CA-02]**

**Agenda item: 7.2.10**

**Document for:** **Discussion/Decision**

# Introduction

Per Chair’s guidance, the following email discussion is allocated.

[106-e-NR-MRDC-CA-02] Email discussion/approval on corrections to 38.214 on cross-carrier scheduling A-CSI-RS triggering ([R1-2106733](file:///D%3A%5CDocuments%5C3GPP%20documents%5CRAN1%5CTSGR1_106-e%5CDocs%5CR1-2106733.zip)) until August 20 – Xingguang (ZTE)

This document is used to collect companies’ views on the spec changes in draft CR R1-2106733.

# Discussion

## Change#1

### Background

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| ***Reason for change:*** | **Change#1:**Based on the previous RAN1 agreements shown below, in the following two cases, UE obtains its QCL assumption for the scheduled PDSCH from the activated TCI state with the lowest ID applicable to PDSCH in the active BWP of the scheduled cell.**Case1**: when the offset between the reception of the DL DCI and the corresponding PDSCH is less than the threshold timeDurationForQCL**Case2**: when the DL DCI does not have the TCI field presentEach case (Case1 and Case2) above is described via “when …” in the current spec. However, in CR R1-2102218 from RAN1#104-e, another “when …” is added in this paragraph. Three “when ….” are followed by “for both the cases”, it is not clear how to interpret the two cases. For example, it is not clear whether the first two “when …” is mapped to the first case or whether the last two “when …” is mapped to the second case.Agreements**: (RAN1#97 meeting)*** When PDSCH and its scheduling PDCCH are in the different CCs, if the PDCCH-to-PDSCH delay < *~~Threshold-Sched-Offset~~ timeDurationForQCL* or if the TCI information is absent from the DCI, the UE obtains its QCL assumption for the scheduled PDSCH from the activated TCI state with the lowest ID applicable to PDSCH in the active BWP of the scheduled cell
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| ***Summary of change:*** | **Change#1:** Clarify the two cases when UE obtains its QCL assumption for the scheduled PDSCH from the activated TCI state with the lowest ID applicable to PDSCH in the active BWP of the scheduled cell. |
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| ***Consequences if not approved:*** | **Change#1:** It is not clear what the two intended cases are when UE obtains its QCL assumption for the scheduled PDSCH from the activated TCI state with the lowest ID applicable to PDSCH in the active BWP of the scheduled cell. |

### Question#1: What’s your view on the following spec change for Section 5.1.5 of TS38.214?

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| 5.1.5 Antenna ports quasi co-location<----------------------Unchanged parts are omitted--------------->If the PDCCH carrying the scheduling DCI is received on one component carrier, and the PDSCH scheduled by that DCI is on another component carrier:- The *timeDurationForQCL* is determined based on the subcarrier spacing of the scheduled PDSCH. If µPDCCH < µPDSCH an additional timing delay $d\frac{2^{μ\_{PDSCH}}}{2^{μ\_{PDCCH}}}$ is added to the *timeDurationForQCL*, where *d* is defined in 5.2.1.5.1a-1, otherwise *d* is zero;- When the UE is configured with *enableDefaultBeamForCCS*, for both the cases, when the offset between the reception of the DL DCI and the corresponding PDSCH is less than the threshold *timeDurationForQCL,* and when the DL DCI does not have the TCI field present, the UE obtains its QCL assumption for the scheduled PDSCH from the activated TCI state with the lowest ID applicable to PDSCH in the active BWP of the scheduled cell.<----------------------Unchanged parts are omitted---------------> |

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| Company | Comments |
| Intel | We are supportive to the CR |
| MTK | We are fine with the CR |
| vivo | OK with the changes. |
| Huawei, HiSilicon | The issue is clearly editorial and the changes can be further improved – would be clearer to use “if” as in the agreements, since “for both” is not clear in terms “and” or “or” - the agreements says “or”. |
| OPPO | We are fine with Huawei’s proposal to use if instead of when for the two cases. |
| ZTE | We are supportive to the CR. Huawei’s proposal to use “if” instead of “when” is also ok for us, which will goes like the following.- When the UE is configured with *enableDefaultBeamForCCS*, if the offset between the reception of the DL DCI and the corresponding PDSCH is less than the threshold *timeDurationForQCL,* or if the DL DCI does not have the TCI field present, the UE obtains its QCL assumption for the scheduled PDSCH from the activated TCI state with the lowest ID applicable to PDSCH in the active BWP of the scheduled cell. |
| NTT DOCOMO | Ok for the change with using “if” for the two cases |
| CATT | We are OK for further clarification. However, the proposed change is not clear either. Our suggestions are as follows,While~~en~~ the UE is configured with *enableDefaultBeamForCCS*, for both ~~the~~ cases, and ~~when~~ the offset between the reception of the DL DCI and the corresponding PDSCH is less than the threshold *timeDurationForQCL,* and ~~when~~ the DL DCI does not have the TCI field present, the UE obtains its QCL assumption for the scheduled PDSCH from the activated TCI state with the lowest ID applicable to PDSCH in the active BWP of the scheduled cell. |
| Qualcomm | We are fine with the CR. “,” should be removed together with “and”. The newer version from ZTE is ok too.  |

## Change#2:

### Background

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| ***Reason for change:*** | **Change#2:**In current specification, if the sub-carrier spacings of scheduling PDCCH and scheduled PDSCH are different, the UE gets *timeDurationForQCL* based on the sub-carrier spacing of the scheduled PDSCH. The UE gets default beam of scheduled PDSCH according to the determined *timeDurationForQCL.* But for AP-CSI-RS, there is no clarification about which sub-carrier spacing is used to get the *beamSwitchTiming* in case thatthe sub-carrier spacings of scheduling PDCCH and scheduled AP-CSI-RS are different*.* It will lead to some ambiguities to get the default beam of AP-CSI-RS.In addition, there is some ambiguity on whether *‘beamSwitchTiming* + *d* $∙2^{μ\_{CSIRS}}/2^{μ\_{PDCCH}}$*’* or *beamSwitchTiming* is threshold reported by the UE. So we propose to add clarification about the sub-carrier spacing for getting the *beamSwitchTiming*, following the same approach as for *timeDurationForQCL.* |
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| ***Summary of change:*** | **Change#2:** Clarify about the sub-carrier spacing for getting the *beamSwitchTiming,* following the same approach as for *timeDurationForQCL*. |
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| ***Consequences if not approved:*** | **Change#2:** It will lead to some ambiguities to get the default beam of AP-CSI-RS.In addition, there is some ambiguities on whether *‘beamSwitchTiming* + *d* $∙2^{μ\_{CSIRS}}/2^{μ\_{PDCCH}}$*’* or *beamSwitchTiming* is threshold reported by the UE |

Note that, the proposed spec change for Change#2 is aligned with the following spec for cross-carrier scheduling of PDSCH in section 5.1.5 of TS38.214 as highlighted below.

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| If the PDCCH carrying the scheduling DCI is received on one component carrier, and the PDSCH scheduled by that DCI is on another component carrier:- The *timeDurationForQCL* is determined based on the subcarrier spacing of the scheduled PDSCH. If µPDCCH < µPDSCH an additional timing delay C:\Users\10240317\AppData\Local\Temp\ksohtml64696\wps1.jpg is added to the *timeDurationForQCL*, where *d* is defined in 5.2.1.5.1a-1, otherwise *d* is zero;- For both the cases, when the UE is configured with *enableDefaultBeamForCCS*, and when the offset between the reception of the DL DCI and the corresponding PDSCH is less than the threshold *timeDurationForQCL,* and when the DL DCI does not have the TCI field present, the UE obtains its QCL assumption for the scheduled PDSCH from the activated TCI state with the lowest ID applicable to PDSCH in the active BWP of the scheduled cell. |

### Question#2: What’s your view on the following spec change for Section 5.2.1.5.1a of TS38.214?

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| 5.2.1.5.1a Aperiodic CSI Reporting/Aperiodic CSI-RS when the triggering PDCCH and the CSI-RS have different numerologiesWhen the triggering PDCCH and the triggered aperiodic CSI-RS are of different numerologies, the behavior defined in 5.2.1.5.1 for the case where the numerologies are the same applies with the following exceptions:Beam switch timing:- If the scheduling offset between the last symbol of the PDCCH carrying the triggering DCI and the first symbol of the aperiodic CSI-RS resources in a *NZP-CSI-RS-ResourceSet* configured without higher layer parameter *trs-Info* is smaller than *beamSwitchTiming* + *d* $∙2^{μ\_{CSIRS}}/2^{μ\_{PDCCH}}$ in CSI-RS symbols*,* as defined in [13, TS 38.306], when the reported value *beamSwitchTiming* associated with the subcarrier spacing of the scheduled aperiodic CSI-RS is one of the values of {14, 28, 48} and *enableBeamSwitchTiming* is not provided, or is smaller than 48+ $d∙2^{μ\_{CSIRS}}/2^{μ\_{PDCCH}}$ in CSI-RS symbolswhen the UE provides *beamSwitchTiming-r16* and *enableBeamSwitchTiming* is provided and the *NZP-CSI-RS-ResourceSet* is configured with the higher layer parameter *repetition* set to 'off' or configured without the higher layer parameter *repetition,* or is smaller than *beamSwitchTiming-r16 +* $d∙2^{μ\_{CSIRS}}/2^{μ\_{PDCCH}}$ in CSI-RS symbols*,* wherein the reported value *beamSwitchTiming-r16* is based on the subcarrier spacing of the scheduled aperiodic CSI-RS, when *enableBeamSwitchTiming* is provided and the *NZP-CSI-RS-ResourceSet* is configured with the higher layer parameter *repetition* set to 'on', where if the µPDCCH < µCSIRS, the beam switching timing delay *d* is defined in Table 5.2.1.5.1a-1, else *d* is zero<----------------------Unchanged parts are omitted---------------> |

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| Company | Comments |
| Intel | *beamSwitchTiming* is the parameter name of UE capability, so there should be no confusion of the current wording. We are open if most companies see an issue. One more question, since ‘*beamSwitchTiming* + *d* $∙2^{μ\_{CSIRS}}/2^{μ\_{PDCCH}}$’ appears in many places in the specification, is it the intention to change all the occurrences in the same way as proposed?  |
| MTK | We support the CR. Current spec does have ambiguity on whether *‘beamSwitchTiming* + *d* $∙2^{μ\_{CSIRS}}/2^{μ\_{PDCCH}}$*’* or *beamSwitchTiming* is threshold reported by the UE. To our understanding, UE should report *beamSwitchTiming*. |
| vivo | The changes seem not necessary. The spec text says that “*beamSwitchTiming* + *d* $∙2^{μ\_{CSIRS}}/2^{μ\_{PDCCH}}$ in CSI-RS symbols”, thus it is clear that the SCS should be associated with the CSI-RS in cross carrier triggering case. |
| Huawei, HiSilicon | Understand the intention but no need. *beamSwitchTiming* is already defined in 306 since R15. The SCS has to be CSI-RS in order to be “in CSI-RS symbols”. |
| OPPO | Not necessary. Agree with vivo. |
| ZTE | Thanks for the comments. Regarding Intel’s question, after checking the whole TS38.214, it seems all the ‘*beamSwitchTiming* + *d* $∙2^{μ\_{CSIRS}}/2^{μ\_{PDCCH}}$’ with potential confusion are in section 5.2.1.5.1a. Since they are all in the same section, updating the first place in this section like what we did in our CR is sufficient from our perspective. But if companies prefer to update all the other 4 places, we are also fine.Note that, the changes above is also aligned with the existing spec in Section 5.1.6.1.1 as shown below.*For frequency range 2, the UE does not expect that the scheduling offset between the last symbol of the PDCCH carrying the triggering DCI and the first symbol of the aperiodic CSI-RS resources is smaller than beamSwitchTiming + d*$∙2^{μ\_{CSIRS}}/2^{μ\_{PDCCH}}$ *in CSI-RS symbols, where beamSwitchTiming is UE reported value defined in [13, TS 38.306], the reported value is one of the values of {14, 28, 48}, and the beam switching timing delay d is defined in Table 5.2.1.5.1a-1 if µPDCCH < µCSIRS , else d is zero.*Regarding the numerology of *beamSwitchTiming*, our concern is that it doesn’t mention the SCS for it. It may be confusing considering that both u\_CSIRS and u\_PDCCH are mentioned in this equation. |
| NTT DOCOMO | Ok for the change |
| CATT | We don’t see this is an essential change.  |
| Qualcomm | We are fine with the change, but “scheduled aperiodic CSI-RS” should be “triggered aperiodic CSI-RS”. |

# Conclusion

TBD