3GPP TSG RAN WG1 #103-e R1-200xxxx

e-Meeting, October 26th – November 13th, 2020

**Agenda item: 7.2.10**

**Source: Moderator (Nokia)**

**Title: Summary of Email discussion** **[103-e-NR-MRDC-CA-02]**

**Document for: Discussion and Decision**

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# 1 Introduction

This document facilitates and summarizes the AI 7.2.10 *Maintenance of Multi-RAT Dual-Connectivity and Carrier Aggregation enhancements* email thread #2:

[103-e-NR-MRDC-CA-02] Email discussion/approval on PC for DC, X-CC scheduling and 1-Tx enhancements until 10/29 with potential CRs by 11/5 – Karri (Nokia)

* **PC-DC Issue 2:** (R1-2007736 and CR1 for power control) Clarification on the timing relation for Dynamic Power Sharing
* **PC-DC Issue 3:** (R1-2008503, P1 and TP) On FDD scenario for Semi-Static-mode2 power control
* **PC-DC Issue 4:** (R1-2008694, TP) Alignment between UE capability description on TS38.306 and UE’s behaviour on TS38.213.
* **XCC A-1 (R1-2007736):** Discuss if there is a need to add the PDSCH starting time to determine the last DCI in order to be able to indicate different PRIs in the same PUCCH slot for the two HARQ-ACKs in the scenario described in R1-2007736.
* **XCC A-2 (R1-2007807):** The clarification on the RRC parameter applicability between URLLC priority based codebook and secondary PUCCH group codebook would seem to benefit from the suggested clarification. Discuss the TP1 and TP2 to TS38.213 sections 7.2 and 9 respectively.
* **XCC A-3 (R1-2007807):** Interoperability of the simultaneous configuration of *pdsch-HARQ-ACK-CodebookList-r16* and *pdsch-HARQ-ACK-Codebook-secondaryPUCCHgroup-r16* would seem to be in a need of clarification. Discuss how to resolve the interoperability issue.
* **XCC A-4 (R1-2008504):** Discuss the need for introducing the additional delay ‘d’ for *timeDurationForQCL* in case of CCS when *enableDefaultBeamForCCS* is not configured as proposed in section 3 of R1-2008504 to 38.214 subclause 5.1.5
* **1TX C-1 (R1-2007737):** There appears to be a discrepancy between the UE capabilities and the TS38.213 for the TDD and FDD PCell semi-static UL transmission in all subframes and a correction is needed. Discuss section 2.2 and CR4 in R1-2007737.

# 2 UL Power Control for Dual Connectivity

Three issues related to the UL power control for dual connectivity are in the scope of this email thread. The Email tread summary erroneously listed CR2 of ‘7736 as the text proposal in scope, but it should be obvious that this was a mistake as CR1 is the text proposal relevant to UL PC for DC.

* **PC-DC Issue 2:** (R1-2007736 and CR1 for power control) Clarification on the timing relation for Dynamic Power Sharing
* **PC-DC Issue 3:** (R1-2008503, P1 and TP) On FDD scenario for Semi-Static-mode2 power control
* **PC-DC Issue 4:** (R1-2008694, TP) Alignment between UE capability description on TS38.306 and UE’s behaviour on TS38.213.

### 2.1 PC-DC Issue 2

**PC-DC Issue 2:** (R1-2007736 and CR1 for power control) Clarification on the timing relation for Dynamic Power Sharing

**Moderator proposal:** Agree to CR1 in R1-2007736 to TS38.213 subclause 7.6.2

Company comments

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| Company | Yes or No | Comments |
| ZTE | Yes | We are supportive of this CR.Currently, there are mixed descriptions on whether the PDCCH in MCG that is exactly Toffset before the transmission occasion in SCG should be considered valid or not. Some of the descriptions are even conflicting with each other. Blow is an example that conflicting with each other.

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| If a UE - is provided *dynamic* for *nrdc-PCmode-FR1-r16* or for *nrdc-PCmode-FR2-r16*, and - indicates a capability to determine a total transmission power on the SCG at a first symbol of a transmission occasion on the SCG by determining transmissions on the MCG that- are scheduled by DCI formats in PDCCH receptions with a last symbol that is earlier by more than $T\_{offset}$ from the first symbol of the transmission occasion on the SCG, or are configured by higher layers, and - overlap with the transmission occasion on the SCG the UE determines a maximum transmission power on the SCG at the beginning of the transmission occasion on the SCG as - $min\left(\hat{P}\_{SCG},\hat{P}\_{Total}^{NR-DC}- \hat{P}\_{MCG}^{actual}\right)$, if the UE determines transmissions on the MCG with a $\hat{P}\_{MCG}^{actual}$ total power- $\hat{P}\_{Total}^{NR-DC}$, if the UE does not determine any transmissions on the MCGwhere- $T\_{offset}=max⁡\{T\_{proc,MCG}^{max},T\_{proc,SCG}^{max}\}$,- $T\_{proc,MCG}^{max}$ and $T\_{proc,SCG}^{max}$ is the maximum of $T\_{proc,2}$, $T\_{proc,CSI}$, $T\_{proc,release}^{mux}$, $T\_{proc,2}^{mux}$, and $T\_{proc,CSI}^{mux}$based on the configurations on the MCG and the SCG, respectively, when the UE indicates the value of 'long' for the capability, - $T\_{proc,MCG}^{max}$ and $T\_{proc,SCG}^{max}$ is the maximum of $T\_{proc,2}$, $T\_{proc,release}^{mux}$, $T\_{proc,2}^{mux}$based on the configurations on the MCG and the SCG, respectively, when the UE indicates the value of 'short' for the capability, and- $\hat{P}\_{MCG}^{actual}$ is the total power for the transmissions on the MCG that overlap with the transmission occasion on the SCG where $\hat{P}\_{MCG}^{actual}$ is determined based on transmissions configured by higher layers and on transmissions scheduled by DCI formats in PDCCH receptions with a last symbol that is at least $T\_{offset}$ before the first symbol of the transmission occasion on the SCG. |

Thus, we believe the CR is needed, otherwise network and UE are not clear how to understand the conflicting descriptions.  |
| Qualcomm | No | We do not think this is an essential. Here, “the first symbol of the transmission occasion on the SCG” is actual timing. Whether the exact timing T0 – T\_offset is expected DCI occasion or not is not a matter practically. |
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### 2.2 PC-DC Issue 3

**PC-DC Issue 3:** (R1-2008503, P1 and TP) On FDD scenario for Semi-Static-mode2 power control

* **Proposal 1 [R1-2008503]: To define the UE behaviour on FDD scenario for semi-static-mode2 power control in NR-DC, adopt the following TP to 38.213 Section 7.6.2:**

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| If a UE is provided *semi-static-mode2* for *nrdc-PCmode-FR1* or for *nrdc-PCmode-FR2*- if the UE is not provided *tdd-UL-DL-ConfigurationCommon* for the MCG or SCG, the UE determines a transmission power for the MCG or for the SCG as described in Clauses 7.1 through 7.5 using or as the maximum transmission power, respectively.- if at least one symbol of slot of the MCG or of the SCG that is indicated as uplink or flexible to a UE by *tdd-UL-DL-ConfigurationCommon* and *tdd*-*UL-DL-ConfigurationDedicated*, if provided, overlaps with a symbol for any ongoing transmission overlapping with slot of the SCG or of the MCG, respectively, the UE determines a power for the transmission on the SCG or the MCG overlapping with slot as described in Clauses 7.1 through 7.5 using or , respectively, as the maximum transmission power- otherwise, the UE determines a power for the transmission on MCG or the SCG overlapping with slot , as described in [8-3, TS 38.101-3] and in Clauses 7.1 through 7.5 without considering or , respectively |

**Moderator proposal:** Agree to the TP of proposal 1 in R1-2008503 to TS38.213 subclause 7.6.2

Company comments

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| Company | Yes or No | Comments |
| ZTE | Yes | We are fine with the moderator proposal. |
| Qualcomm |  | OK with the intention but the TP is not accurate. It should be like following (including one more change that is to use “paired spectrum” explicitly):* if MCG or SCG comprises only paired spectrum, the UE determines a transmission power for the SCG or for the MCG as described in Clauses 7.1 through 7.5 using PSCG or PMCG, respectively.
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### 2.3 PC-DC Issue 4

**PC-DC Issue 4:** (R1-2008694, TP) Alignment between UE capability description on TS38.306 and UE’s behaviour on TS38.213.

[R1-2008694] To avoid misalignmed between UE capability description on TS38.306 and UE behaviour desctiption on TS38.213, we suggest text proposal for TS38.213 as below:

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| 7.6.2 NR-DC*<text omitted>*If a UE - is provided *dynamic* for *nrdc-PCmode-FR1-r16* or for *nrdc-PCmode-FR2-r16*, and - indicates a capability to support dynamic power sharing for intra-FR NR DC,~~- indicates a capability to determine a total transmission power on the SCG at a first symbol of a transmission occasion on the SCG by determining transmissions on the MCG that~~~~- are scheduled by DCI formats in PDCCH receptions with a last symbol that is earlier by more than~~ $T\_{offset}$ ~~from the first symbol of the transmission occasion on the SCG, or are configured by higher layers, and~~ ~~- overlap with the transmission occasion on the SCG~~ the UE determines a maximum transmission power on the SCG at a first symbol of a transmission occasion on the SCG by determining transmissions on the MCG that- are scheduled by DCI formats in PDCCH receptions with a last symbol that is earlier by more than $T\_{offset}$ from the first symbol of the transmission occasion on the SCG, or are configured by higher layers, and - overlap with the transmission occasion on the SCG The maximum transmission power on the SCG is determined as ~~UE determines a maximum transmission power on the SCG at the beginning of the transmission occasion on the SCG as~~ - $min\left(\hat{P}\_{SCG},\hat{P}\_{Total}^{NR-DC}- \hat{P}\_{MCG}^{actual}\right)$, if the UE determines transmissions on the MCG with a $\hat{P}\_{MCG}^{actual}$ total power- $\hat{P}\_{Total}^{NR-DC}$, if the UE does not determine any transmissions on the MCG*<text omitted>* |

**Moderator proposal:** Agree to the TP of R1-2008964 to TS38.213 subclause 7.6.2

Company comments

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| Company | Yes or No | Comments |
| ZTE | Yes | We are fine with the above TP.Note: if the TP in “2.1 PC-DC Issue 2” is approved, then “by more than Toffset” above should be updated to “by at least Toffset”. |
| Qualcomm | Yes | OK with the change. |
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# 3 Cross carrier scheduling

Four issues related to cross carrier scheduling are in the scope of this email thread.

* **XCC A-1 (R1-2007736):** Discuss if there is a need to add the PDSCH starting time to determine the last DCI in order to be able to indicate different PRIs in the same PUCCH slot for the two HARQ-ACKs in the scenario described in R1-2007736.
* **XCC A-2 (R1-2007807):** The clarification on the RRC parameter applicability between URLLC priority based codebook and secondary PUCCH group codebook would seem to benefit from the suggested clarification. Discuss the TP1 and TP2 to TS38.213 sections 7.2 and 9 respectively.
* **XCC A-3 (R1-2007807):** Interoperability of the simultaneous configuration of *pdsch-HARQ-ACK-CodebookList-r16* and *pdsch-HARQ-ACK-Codebook-secondaryPUCCHgroup-r16* would seem to be in a need of clarification. Discuss how to resolve the interoperability issue.
* **XCC A-4 (R1-2008504):** Discuss the need for introducing the additional delay ‘d’ for *timeDurationForQCL* in case of CCS when *enableDefaultBeamForCCS* is not configured as proposed in section 3 of R1-2008504 to 38.214 subclause 5.1.5

### 3.1 XCC A-1 (R1-2007736)

**XCC A-1 (R1-2007736):** Discuss if there is a need to add the PDSCH starting time to determine the last DCI in order to be able to indicate different PRIs in the same PUCCH slot for the two HARQ-ACKs in the scenario described in R1-2007736.

 **“…***if the DSCH starting time in addition to the existing MO index and Cell index is not applied to determine the “last DCI”, then network has to indicate the same PRI in these different DCIs in this MO. This kind of restriction on network implementation has no justification. Thus, it is preferred that the PDSCH starting time in addition to the existing MO index and Cell index can also be applied to determine the “last DCI”.****”***[R1-2007736]

Moderator thought: The motivation for the gNB to need to be able to indicate different PRIs in this case is unclear.

**Moderator proposal:** Do NOT agree to the CR2 in R1-2007736

Company comments

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| Company | Yes or No | Comments |
| ZTE |  | We believe CR2 in R1-2007736 is needed.The gNB may set the PRI field based on the PUCCH resource set. Different PUCCH resource set may need different PRI value. For example, if two DCIs are transmitted in the same MO, for the first DCI, gNB understands that PUCCH resource set 0 is applied according to the current codebook size. However, for the second DCI in the same MO, gNB understands that PUCCH resource set 1 is applied because the codebook size is increased. In this case, different PRI may be beneficial. |
| Qualcomm | No  | If UE has received multiple scheduling DCIs in a same PO, it is reasonable that the HARQ-ACK in the same codebook on the same PUCCH reasonable. It seems unnecessary to further fragment the feature to support HARQ-ACK in different codebooks for scheduling DCIs in same PO. |
| Spreadtrum | No | Agree with Qualcomm, it should be same PRI in all DCIs in a same PO. There is no reason for gNB indicates different values for different DCIs. |
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### 3.2 XCC A-2 (R1-2007807)

**XCC A-2 (R1-2007807):** The clarification on the RRC parameter applicability between URLLC priority based codebook and secondary PUCCH group codebook would seem to benefit from the suggested clarification. Discuss the TP1 and TP2 to TS38.213 sections 7.2 and 9 respectively.

**Moderator proposal:** Agree to the TPs to TS 38.213 subclauses 7.2 and 9 in R1-2007807

Company comments

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| Company | Yes or No | Comments |
| ZTE | Yes | We are fine with the moderator proposal. |
| Qualcomm | Yes | We are fine with the TPs. |
| Spreadtrum | Yes | We are fine with the TPs. |
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### 3.3 XCC A-3 (R1-2007807)

**XCC A-3 (R1-2007807):** Interoperability of the simultaneous configuration of *pdsch-HARQ-ACK-CodebookList-r16* and *pdsch-HARQ-ACK-Codebook-secondaryPUCCHgroup-r16* would seem to be in a need of clarification. Discuss how to resolve the interoperability issue.

**Proposal 2 [R1-2007807]: “**Discuss whether to introduce a new RRC parameter to separately configure the HARQ-ACK codebook type for the two HARQ-ACK codebooks for the secondary PUCCH group. If the new RRC parameter is not introduced, clarify that *pdsch-HARQ-ACK-Codebook-secondaryPUCCHgroup-r16* should not be configured or should be ignored if *pdsch-HARQ-ACK-CodebookList-r16* is configured.”

Moderator thought: The absolute necessity for the new RRC parameter is not clear, and the ASN.1 has been frozen since June/2020, hence the introduction of a new RRC parameter is not recommended.

**Moderator proposal:** Do NOT introduce a new RRC parameter. Agree that *pdsch-HARQ-ACK-Codebook-secondaryPUCCHgroup-r16* should be ignored if *pdsch-HARQ-ACK-CodebookList-r16* is configured.

Company comments

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| Company | Yes or No | Comments |
| ZTE |  | We are fine to introduce a new RRC parameter. There are two separate RRC parameters to configure same/different HARQ-ACK codebook types for each PUCCH group, i.e., pdsch-HARQ-ACK-Codebook for primary PUCCH group and pdsch-HARQ-ACK-Codebook-secondaryPUCCHgroup-r16 for the secondary PUCCH group. However, there is only one RRC parameter *pdsch-HARQ-ACK-CodebookList-r16* to configure the URLLC enhanced HARQ-ACK codebook per CG. If two PUCCH groups are configured, it is not clear whether *pdsch-HARQ-ACK-CodebookList-r16* is applied to primary PUCCH group, secondary PUCCH group or both. Also, as 38.331 shown below, if *pdsch-HARQ-ACK-CodebookList-r16* is configured, pdsch-HARQ-ACK-Codebook is ignored.

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| ***pdsch-HARQ-ACK-CodebookList***A list of configuration for at least two simultaneously constructed HARQ-ACK codebooks. Each configuration in the list is defined in the same way as *pdsch-HARQ-ACK-Codebook* (see TS 38.212 [17], clause 7.3.1.2.2 and TS 38.213 [13], clauses 7.2.1, 9.1.2, 9.1.3 and 9.2.1). If this field is present, the field *pdsch-HARQ-ACK-Codebook* is ignored for the case at least two HARQ-ACK codebooks are simultaneously constructed. |

Based on the above, there are at least the following approaches.**Approach#1**: UE is not expected to configure two PUCCH groups if *pdsch-HARQ-ACK-CodebookList-r16* is configured.**Approach#2**: The same RRC configuration *pdsch-HARQ-ACK-CodebookList-r16* is applied to both primary PUCCH group and secondary PUCCH group if two PUCCH groups are configured.**Approach#3**: The RRC configuration *pdsch-HARQ-ACK-CodebookList-r16* is only applied to primary PUCCH group and add another new RRC parameter for the secondary PUCCH group.**Approach#4**: The RRC configuration *pdsch-HARQ-ACK-CodebookList-r16* is only applied to primary PUCCH group and do NOT introduce another new RRC parameter for the secondary PUCCH group. In this case, UE still follows RRC parameter pdsch-HARQ-ACK-Codebook-secondaryPUCCHgroup-r16 for the second PUCCH group.It seems we have to choose one of the approaches above, some more discussion may be beneficial. Our preference for these approaches are as following, i.e., Approach#3 > Approach#2 > Approach#4 > Approach#1.  |
| Qualcomm | No | Agree with Moderator that no new RRC parameter is necessary to avoid ASN.1 impact. |
| Spreadtrum |  | Regarding this later stage, it is not proposed to introduce a new RRC parameter as in Approach#3. As other approaches, Approach#4 is better. In this case, gNB can configure two HARQ-ACK codebooks in the first PUCCH cell group which can be used for eMBB and URLLC traffics. And only one HARQ-ACK codebook is generated in the second PUCCH cell group, which is sufficient from our understanding. According to Moderator’s proposal, we can also fine with it. |
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### 3.4 XCC A-4 (R1-2008504)

**XCC A-4 (R1-2008504):** Discuss the need for introducing the additional delay ‘d’ for *timeDurationForQCL* in case of CCS when *enableDefaultBeamForCCS* is not configured as proposed in section 3 of R1-2008504 to 38.214 subclause 5.1.5

Moderator thought: ASUSTeK made a compelling argument that the change is not needed as as base station would always configure *enableDefaultBeamForCCS-r16* for cross carrier scheduling with different numerologies. That is, the proposed change is non-essential.

**Moderator proposal:** Do NOT agree to the TP in section 3 of the R1-2008504 to TS 38.214 subclause 5.1.5

Company comments

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| Company | Yes or No | Comments |
| ZTE |  | We are fine with the Moderator proposal.First of all, we would like to clarify the current specification.In Rel-15, only same-SCS cross-carrier scheduling is allowed and no default beam is supported because UE is always expected to be scheduled with scheduling delay larger than the *timeDurationForQCL*.In Rel-16, if *enableDefaultBeamForCCS* is configured, the existing spec is clear. If *enableDefaultBeamForCCS* is NOT configured, it seems this case is covered by the following spec.

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| *When the UE is configured with CORESET associated with a search space set for cross-carrier scheduling and the UE is not configured with [enableDefaultBeamForCSS], the UE expects tci-PresentInDCI is set as 'enabled' or tci-PresentForDCI-Format1-2-r16 is configured for the CORESET, and if one or more of the TCI states configured for the serving cell scheduled by the search space set contains 'QCL-TypeD', the UE expects the time offset between the reception of the detected PDCCH in the search space set and the corresponding PDSCH is larger than or equal to the threshold timeDurationForQCL.* |

* Then for same-SCS cross-carrier scheduling, it has not issue as this is the same UE behavior as Rel-15.
* While for different-SCS cross-carrier scheduling, *timeDurationForQCL* may be not sufficient. As clarified by Moderator and ASUSTeK, one way to handle this issue is that network always configures *enableDefaultBeamForCSS* for UEs configured with different-SCS cross-carrier scheduling. In this case, as long as UE supports FG18-5a together with FG18-5 (DL cross-carrier scheduling with different SCS), the UE behavior is clear.
 |
| Qualcomm | Yes | We agree with MediaTek that a clarification CR is needed. This makes the spec accurately reflect previous agreements. As for ASUSTeK’s argumentd, there is no agreement that network always configures *enableDefaultBeamForCSS* for different-SCS cross-carrier scheduling. We also do not think such a new agreement is needed just for fixing an alignment issue. |
| Spreadtrum | Yes | We support the TP in section 3 of the R1-2008504. It captures the previous agreement correctly in the spec. |
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# 4 1-Tx EN-DC enhancements

One issue related to single Tx EN-DC enhancements is in the scope of this email thread.

* **1TX C-1 (R1-2007737):** There appears to be a discrepancy between the UE capabilities and the TS38.213 for the TDD and FDD PCell semi-static UL transmission in all subframes and a correction is needed. Discuss section 2.2 and CR4 in R1-2007737.

**Moderator proposal:** Agree to the TP of CR4 in R1-2007737 to TS38.213 subclause 5.1 and 8

Company comments

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| Company | Yes or No | Comments |
| ZTE | Yes | We are supportive of the above TP.Note: The TP is for 3**6**.213 instead of 3**8**.213. |
| Qualcomm | Yes | OK with the proposal. |
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# 5 Conclusions

To be written

# 6 References

1. R1-2009219 Moderator summary of the 4 feature lead summaries of 7.2.10 in preparation of RAN1#103-e, Moderator (Nokia)
2. R1-2008897 FL summary on support of unaligned frame boundary for R16 NR inter-band CA, Moderator (CMCC)
3. R1-2009210 Summary of maintenance issues for SCell Dormancy, Moderator (Ericsson)
4. R1-2009218 Feature Lead summary on singe Tx enhancements, and cross carrier scheduling and A-CSI RS triggering, Moderator (Nokia)
5. R1-2009231 Feature lead summary #1 on UL Power Control for NN-DC, Moderator (Apple Inc.)