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

**E-Meeting, October 26th – 13th, 2020**

**Agenda Item: 7.1**

**Source: Moderator (Huawei)**

**Title: Summary of Correction on supplementary uplink in 38.213**

**Document for: Discussion and Decision**

# Introduction

As per guidance of the chairman, an email discussion for the Rel-15 CR R1-2008777 [1] was kicked off below.

[103-e-NR-7.1CRs-03] Correction on supplementary uplink in 38.213 (Rel-15) – Huawei

* Discussion and decision by 10/27, TPs by 10/29

 It is a clarification for functionalities as summarized below.

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| **Summary of change:** | 1. Clarify the determination of valid slots for PUCCH repetiton for supplementary uplink. |

# Discussions

Based on the discussions till October 28th, a main concern is raised about how to handle the Rel-16 mirror CR which can resolve potential cross-link interference in case of UL sharing with TDD UEs in the same bandwidth of SUL carrier.

Cross-link interference here means an inter-UE interference where a UL transmission power of a SUL UE may interfere the DL reception of  the other TDD UE that has been configured with overlapping bandwidth. As discussed above, there are three scenarios

* No other FDD nor TDD UEs are configured with the bandwidth overlapping with the SUL UE, regardless Rel-15 or Rel-16
* Some FDD UEs are configured with the bandwidth overlapping with the SUL UE
* Some TDD UEs are configured with the bandwidth overlapping with the SUL UE

In the first two scenarios, there is no cross-link interference as companies replied. Only the last scenario is concerned with cross-link interference. However, such cross-link interference is not caused by the CR R1-2008777 but the fact of lack of tdd-UL-DL-ConfigurationCommon/ tdd-UL-DL-ConfigurationDedicated for SUL carrier.

To handle the Rel-16 CR, three options are provided below,

* **Option A**: Agree the Rel-15 CR and its Rel-16 mirror CR, and the introduction of tdd-UL-DL-ConfigurationCommon/tdd-UL-DL-ConfigurationDedicated is a separate issue and not done by this thread but can be discussed by further CR. The CRs are as drafted in <https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_103-e/Inbox/drafts/7.1/%5B103-e-NR-7.1CRs-03%5D/draft%20R1-2008777-Option%20A.zip>
* **Option B**: Agree the Rel-15 CR. For Rel-16, agree the introduction of tdd-UL-DL-ConfigurationCommon/tdd-UL-DL-ConfigurationDedicated and its associated text for PUCCH repetition as drafted in <https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_103-e/Inbox/drafts/7.1/%5B103-e-NR-7.1CRs-03%5D/draft%20R1-2008777-Option%20B.zip>
* **Option C**: For both Rel-15 and Rel-16, agree the introduction of tdd-UL-DL-ConfigurationCommon/tdd-UL-DL-ConfigurationDedicated and its associated text for PUCCH repetition as drafted in <https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_103-e/Inbox/drafts/7.1/%5B103-e-NR-7.1CRs-03%5D/draft%20R1-2008777-Option%20C.zip>

For your convenience, the text changes are copied below,

============================= Option A =========================

**Option A:**

**The same text change for both Rel-15 CR and Rel-16 mirror CR:**

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| **<Unchanged parts are omitted>**9.2.6 PUCCH repetition procedure**<Unchanged parts are omitted>**For unpaired spectrum, the UE determines the  slots for a PUCCH transmission starting from a slot indicated to the UE as described in Clause 9.2.3 and having- an UL symbol, as described in Clause 11.1, or flexible symbol that is not SS/PBCH block symbol provided by *startingSymbolIndex* in *PUCCH-format1*, or in *PUCCH-format3*, or in *PUCCH-format4* as a first symbol, and- consecutive UL symbols, as described in Clause 11.1, or flexible symbols that are not SS/PBCH block symbols, starting from the first symbol, equal to or larger than a number of symbols provided by *nrofsymbols* in *PUCCH-format1*, or in *PUCCH-format3*, or in *PUCCH-format4*For paired spectrum or supplementary uplink band, the UE determines the  slots for a PUCCH transmission as the  consecutive slots starting from a slot indicated to the UE as described in Clause 9.2.3. **<Unchanged parts are omitted>** |

============================= Option B =========================

**Option B:**

**Rel-15 CR:** the same text change as the Rel-15 CR of Option A

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| **<Unchanged parts are omitted>**9.2.6 PUCCH repetition procedure**<Unchanged parts are omitted>**For unpaired spectrum, the UE determines the  slots for a PUCCH transmission starting from a slot indicated to the UE as described in Clause 9.2.3 and having- an UL symbol, as described in Clause 11.1, or flexible symbol that is not SS/PBCH block symbol provided by *startingSymbolIndex* in *PUCCH-format1*, or in *PUCCH-format3*, or in *PUCCH-format4* as a first symbol, and- consecutive UL symbols, as described in Clause 11.1, or flexible symbols that are not SS/PBCH block symbols, starting from the first symbol, equal to or larger than a number of symbols provided by *nrofsymbols* in *PUCCH-format1*, or in *PUCCH-format3*, or in *PUCCH-format4*For paired spectrum or supplementary uplink band, the UE determines the  slots for a PUCCH transmission as the  consecutive slots starting from a slot indicated to the UE as described in Clause 9.2.3. **<Unchanged parts are omitted>** |

**Rel-16 CR**: Agree to add *tdd-UL-DL-ConfigurationCommon* and *tdd-UL-DL-ConfigurationDedicated* on SUL carrier for Rel-16, additionally the configuration is used to differentiate the branches of UE behaviors, compared to Option A.

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| **<Unchanged parts are omitted>**9.2.6 PUCCH repetition procedure**<Unchanged parts are omitted>**For unpaired spectrum or supplementary uplink band where the UE is provided with *tdd-UL-DL-ConfigurationCommon* or *tdd*-*UL-DL-ConfigurationDedicated*, the UE determines the $N\_{PUCCH}^{repeat}$ slots for a PUCCH transmission starting from a slot indicated to the UE as described in Clause 9.2.3 for HARQ-ACK reporting, or a slot determined as described in Clause 9.2.4 for SR reporting or in Clause 5.2.1.4 of [6, TS 38.214] for CSI reporting and having- an UL symbol, as described in Clause 11.1, or flexible symbol that is not SS/PBCH block symbol provided by *startingSymbolIndex* in *PUCCH-format1*, or in *PUCCH-format3*, or in *PUCCH-format4* as a first symbol, and- consecutive UL symbols, as described in Clause 11.1, or flexible symbols that are not SS/PBCH block symbols, starting from the first symbol, equal to or larger than a number of symbols provided by *nrofsymbols* in *PUCCH-format1*, or in *PUCCH-format3*, or in *PUCCH-format4*For paired spectrum or supplementary uplink band where the UE is not provided with *tdd-UL-DL-ConfigurationCommon* nor *tdd*-*UL-DL-ConfigurationDedicated*, the UE determines the $N\_{PUCCH}^{repeat}$ slots for a PUCCH transmission as the $N\_{PUCCH}^{repeat}$ consecutive slots starting from a slot indicated to the UE as described in Clause 9.2.3 for HARQ-ACK reporting, or a slot determined as described in Clause 9.2.4 for SR reporting or in Clause 5.2.1.4 of [6, TS 38.214] for CSI reporting. **<Unchanged parts are omitted>** |

============================= Option C =========================

**Rel-15 CR:** the same handling as the Rel-16 CR of Option B, agree to add tdd-UL-DL-ConfigurationCommon and tdd-UL-DL-ConfigurationDedicated on SUL carrier for Rel-15

**Rel-16 CR:** the same handling as the Rel-16 CR of Option B, agree to add tdd-UL-DL-ConfigurationCommon and tdd-UL-DL-ConfigurationDedicated on SUL carrier for Rel-16

The same text changes for both Rel-15 and Rel-16,

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| **<Unchanged parts are omitted>**9.2.6 PUCCH repetition procedure**<Unchanged parts are omitted>**For unpaired spectrum or supplementary uplink band where the UE is provided with *tdd-UL-DL-ConfigurationCommon* or *tdd*-*UL-DL-ConfigurationDedicated*, the UE determines the  slots for a PUCCH transmission starting from a slot indicated to the UE as described in Clause 9.2.3 and having- an UL symbol, as described in Clause 11.1, or flexible symbol that is not SS/PBCH block symbol provided by *startingSymbolIndex* in *PUCCH-format1*, or in *PUCCH-format3*, or in *PUCCH-format4* as a first symbol, and- consecutive UL symbols, as described in Clause 11.1, or flexible symbols that are not SS/PBCH block symbols, starting from the first symbol, equal to or larger than a number of symbols provided by *nrofsymbols* in *PUCCH-format1*, or in *PUCCH-format3*, or in *PUCCH-format4*For paired spectrum or supplementary uplink band where the UE is not provided with *tdd-UL-DL-ConfigurationCommon* nor *tdd*-*UL-DL-ConfigurationDedicated*, the UE determines the  slots for a PUCCH transmission as the  consecutive slots starting from a slot indicated to the UE as described in Clause 9.2.3. **<Unchanged parts are omitted>** |

## Q1: Without digging into detailed wording of CRs, which Option above should be the best way to go?

Companies’ views are very welcome.

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| *Company* | *Option A/B/C* | *View* |
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## Q2: For the chosen Option, any suggestion for the detailed wording of the CR

Companies’ views are very welcome.

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| *Company* | *Option A/B/C* | *View* |
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In case of any other important feedback, they are welcome below.

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| *Company* | *View* |
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# Conclusions

[The following agreements are achieved:]

# References

1. R1-2008777 Correction on supplementary uplink in 38.213, Huawei, HiSilicon, Oct. 26th – Nov. 13th, 2020, RAN1#103-e

# Appendix

# UE capability

The UE capability for PUCCH repetition is a per-UE capability without FDD/TDD differentiation, which means a UE supports both FDD and TDD branches of UE behaviors of PUCCH repetition in TS 38.213 if the UE reports a support of such capability.