**3GPP TSG-RAN WG2 Meeting #130 R2-2xxxxxx**

**St.Julians, Malta, 19th – 23rd May 2025**

Agenda Item: 7.0.2.22

Source: MediaTek Inc.

Title: Capturing RAN4 LS in 38.306

Document for: Discussion, Decision

# Introduction

In this contribution, we discussed the way to capture the LS from RAN4 (R2-2501392) into TS 38.306 based on companies contribution R2-2503471, R2-2504123 and R2-2504136.

# Discussion

According to the RAN4 reply LS, the understanding2 is the correct understanding and RAN4 highlight that the band in which the PDCCH order is received has no impact on whether and on which band the interruption may occur:

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| Understanding 2: The source band of the band pair represents **the specific source band that have interruption or not** (depends on the value “*interruption*” or “*noInterruption*”) in the BC when UE performs PDCCH-ordered early RACH toward a target cell on target band. |

All of the three contributions intent to clarify this understanding by RAN4 but in slightly different style.

* R2-2503471 made clarification based on original RAN4 description in UE feature list.
* R2-2504123 made clarification and change the description as the wording of featureset, which is the implemented granularity of these capability in RAN2.
* R2-2504136 made changes and add citing to TS 38.133 as reference.

According to the online discussion, the description of UE capability should be more independent and more readability friendly to the implementation in RAN2. Therefore, the rapporteur would like to discuss using R2-2504123 proposals and wording in the TP as the baseline.

## Updates for pdcch-RACH-AffectedBandsList-r18

In R2-2504123, the proposal 1 and 2 is for the UE capability pdcch-RACH-AffectedBandsList-r18.

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| **Proposal 1 pdcch-RACH-AffectedBandsList-r18 field description is updated to clarify that:**   1. **The feature set entry where the UE includes this capability corresponds to the serving cell that may be impacted during PDCCH-ordered RACH transmission;** 2. **The feature set entry includes a list where each entry in the list corresponds to a target band for RACH transmission;** 3. **PDCCH ordered RACH of which the resources are not fully contained in any of UE's configured UL BWP(s) of active serving cells.**   **Proposal 2 pdcch-RACH-AffectedBandsList field name is updated to pdcch-RACH-TargetBandsList.** |

Rapporteur think the bullet a) and b) has the correct intention, but correction is need in bullet a) to make the description more precise. The bullet c) is not included in the original description of RAN4 Feature list so it should be removed.

The updated proposal 1 is as follows:

**Proposal 1 pdcch-RACH-AffectedBandsList-r18 field description is updated to clarify that:**

**a) The band entry of this feature set corresponds to the band of serving cell that may be affected during PDCCH-ordered RACH transmission;**

**b) The feature set entry includes a list where each entry in the list corresponds to a target band for RACH transmission;**

Rapporteur agree with the intention of proposal2 that pdcch-RACH-AffectedBandsList is a misleading name as the list is made of target bands rather than affected bands. However, if we change the name to pdcch-RACH-TargetBandsList, it will not reflect the purpose of this capability. Also, the rest two capabilities pdcch-RACH-PrepTimeList-r18 and pdcch-RACH-SwitchingTimeList-r18 also have a target band list, and it is hard to differentiate them.

Therefore, Rapporteur suggest to further change the names and make these three capabilities have unified names.

* pdcch-RACH-AffectedBandsList-r18 -> pdcch-RACH-affectedBand-TargetBandList-r18
* pdcch-RACH-PrepTimeList-r18 -> pdcch-RACH-PrepTime-TargetBandList-r18
* pdcch-RACH-SwitchingTimeList-r18-> pdcch-RACH-SwitchingTime-TargetBandList-r18

**Proposal 2 Update the name of the three capabilities as follow:**

* **pdcch-RACH-AffectedBandsList-r18 -> pdcch-RACH-affectedBand-TargetBandList-r18**
* **pdcch-RACH-PrepTimeList-r18 -> pdcch-RACH-PrepTime-TargetBandList-r18**
* **pdcch-RACH-SwitchingTimeList-r18-> pdcch-RACH-SwitchingTime-TargetBandList-r18**

Additionally, if the UE does not support PDCCH-ordered RACH transmission for LTM towards certain target bands indicated in the appliedFreqBandListFilter, it is unclear whether the UE should report *noInterruption* or *interruption* for those elements.

The related change was agreed in RAN2#129 meeting but was put on hold due to the above granularity clarification. Therefore, this change is also reintroduced.

**Proposal 3 Clarify that for those bands indicated in appliedFreqBandListFilter where the UE does not support PDCCH-ordered RACH towards target bands for LTM, it is up to UE implementation to select *noInterruption* or *interruption* for that element.**

With the above proposal 1,2 and 3, the pdcch-RACH-AffectedBandsList-r18 can be updated as follow:

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| ***pdcch-RACH-AffectedBand-TargetBandList-r18***  Indicates whether interruption may occurs on DL slot(s) on serving cells due to PDCCH-ordered RACH transmission towards target bands, as specified in TS 38.133 8.2.2.2.20 [5].  The band entry of this feature set corresponds to the band of serving cell that may be affected during PDCCH-ordered RACH transmission in the target band. Each feature set includes a list where each entry in the list corresponds to a target band for RACH transmission.  The target bands only consist of the bands indicated in *appliedFreqBandListFilter*. They are listed in the same order as in *appliedFreqBandListFilter* and the first entry correspond to the first entry on *appliedFreqBandListFilter* and so on. For those bands indicated in appliedFreqBandListFilter where the UE does not support PDCCH-ordered RACH towards target bands for LTM, it is up to UE implementation to select noInterruption or interruption for that element.  A UE supporting this feature shall also indicate support of *rach-EarlyTA-Measurement-r18*. |

## Updates for pdcch-RACH-PrepTimeList-r18 and pdcch-RACH-SwitchingTimeList-r18

If we agree proposal 1, the same changes can be applied to *pdcch-RACH-PrepTimeList-r18* and *pdcch-RACH-SwitchingTimeList-r18*. These two capabilities are unrelated to serving band affection, so the non-related bullet has been removed from the original proposal in R2-2504123.

**Proposal 4 pdcch-RACH-PrepTimeList-r18 and pdcch-RACH-SwitchingTimeList-r18 field descriptions are updated to clarify that:**

**• The feature set entry includes a list where each entry in the list corresponds to a target band for RACH transmission;**

If the entire field is missing, it is already captured that the UE does not support this feature in any target band, so no further changes are needed. For the meaning of the reported “*notSupported*” of one entry in the list, Rapporteur think it is clear enough that it should represent that the UE does not support PDCCH ordered RACH toward this target band, but is fine to make it more explicit.

**Proposal 5: pdcch-RACH-PrepTimeList-r18 and pdcch-RACH-SwitchingTimeList-r18 field descriptions are updated to clarify that:**

* **When an entry in the list is set to *notSupported*, the UE does not support the feature for that target band**.

For the proposal 5 in R2-2504123, Rapporteur agree with the intention and think it is beneficial to clarify.

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| Lastly, if the proposal above can be clarified, it also implies that the UE shall set consistently the bits in pdcch-RACH-PrepTimeList-r18 and pdcch-RACH-SwitchingTimeList-r18 e.g. it would be ambiguous to report pdcch-RACH-SwitchingTimeList-r18 set to 1 ms for a certain band while setting pdcch-RACH-PrepTimeList-r18 notSupported for the same band.  **Proposal 5: The capability values for pdcch-RACH-PrepTimeList-r18 and pdcch-RACH-SwitchingTimeList-r18 must be set consistently.** |

However, it is a little bit misleading to say the “capability value” must be set consistently as these two capabilities have different values:

* ENUMERATED {ms0, ms0dot25, ms0dot5, ms1, ms2, notSupported}
* ENUMERATED {ms1, ms3, ms5, ms10, notSupported}

Therefore, the proposal 5 is slightly updated as follow:

**Proposal 5: The value of supporting pdcch-RACH-PrepTimeList-r18 and pdcch-RACH-SwitchingTimeList-r18 must be set consistently**.

With the above proposal 3, 4 and 5, the pdcch-RACH-PrepTimeList-r18 and pdcch-RACH-SwitchingTimeList-r18 can be updated as follow:

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| ***pdcch-RACH-PrepTime-TargetBandList-r18***  Indicates the RF/BB preparation time for PDCCH ordered RACH of which the resources are not fully contained in any of UE's configured UL BWP(s) of active serving cells. If absent, the UE does not support PDCCH ordered RACH if the PRACH bandwidth is outside of any configured UL BWP.  Each feature set includes a list where each entry in the list corresponds to a target band for RACH transmission. If an entry is set to *notSupported*, the UE does not support PDCCH ordered RACH if the PRACH bandwidth is outside of any configured UL BWP in that target band.  The target bands only consist of the bands indicated in *appliedFreqBandListFilter*. They are listed in the same order as in *appliedFreqBandListFilter* and the first entry correspond to the first entry on *appliedFreqBandListFilter* and so on.  A UE supporting this feature shall also indicate support of *rach-EarlyTA-Measurement-r18*. The value of supporting pdcch-RACH-PrepTime-TargetBandList-r18 and pdcch-RACH-SwitchingTime-TargetBandList-r18 must be set consistently. |

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| ***pdcch-RACH-PrepTime-TargetBandList-r18***  Indicates the RF/BB preparation time for PDCCH ordered RACH of which the resources are not fully contained in any of UE's configured UL BWP(s) of active serving cells. If absent, the UE does not support PDCCH ordered RACH if the PRACH bandwidth is outside of any configured UL BWP as specified in TS 38.133 6.2.2C.2 [5].  Each entry in the list corresponds to a target band for RACH transmission. If an entry is set to *notSupported*, the UE does not support PDCCH ordered RACH if the PRACH bandwidth is outside of any configured UL BWP in that target band.  The target bands consist of the bands indicated in *appliedFreqBandListFilter*. They are listed in the same order as in *appliedFreqBandListFilter* and the first entry correspond to the first entry on *appliedFreqBandListFilter* and so on.  A UE supporting this feature shall also indicate support of *rach-EarlyTA-Measurement-r18*. A UE that sets *pdcch-RACH-SwitchingTime* to a value different from *notSupported* for a target band also sets *pdcch-RACH-PrepTime* to a value different from *notSupported for that target band*. |

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| ***pdcch-RACH-SwitchingTime-TargetBandList-r18***  Indicates the interruption length (Y ms) due to RF re-tuning for PDCCH ordered RACH of which the resources are not fully contained in any of UE's configured UL BWP(s) of active serving cells, if absent, the UE does not support PDCCH ordered RACH if the PRACH bandwidth is outside of any configured UL BWP.  Each feature set includes a list where each entry in the list corresponds to a target band for RACH transmission. If an entry is set to *notSupported*, the UE does not support PDCCH ordered RACH if the PRACH bandwidth is outside of any configured UL BWP in that target band.  The target bands only consist of the bands indicated in *appliedFreqBandListFilter*. They are listed in the same order as in *appliedFreqBandListFilter* and the first entry correspond to the first entry on *appliedFreqBandListFilter* and so on.  A UE supporting this feature shall also indicate support of *rach-EarlyTA-Measurement-r18*. The value of supporting *pdcch-RACH-PrepTime-TargetBandList-r18* and *pdcch-RACH-SwitchingTime-TargetBandList-r18* must be set consistently. |

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| ***pdcch-RACH-SwitchingTime-TargetBandList-r18***  Indicates the interruption length (Y ms) due to RF re-tuning for PDCCH ordered RACH of which the resources are not fully contained in any of UE's configured UL BWP(s) of active serving cells, if absent, the UE does not support PDCCH ordered RACH if the PRACH bandwidth is outside of any configured UL BWP as specified in TS 38.133 8.2.2.2.20 [5]  Each entry in the list corresponds to a target band for RACH transmission. If an entry is set to *notSupported*, the UE does not support PDCCH ordered RACH if the PRACH bandwidth is outside of any configured UL BWP in that target band.  The target bands only consist of the bands indicated in *appliedFreqBandListFilter*. They are listed in the same order as in *appliedFreqBandListFilter* and the first entry correspond to the first entry on *appliedFreqBandListFilter* and so on.  A UE supporting this feature shall also indicate support of *rach-EarlyTA-Measurement-r18*. A UE that sets an entry in *pdcch-RACH-PrepTime* to a value different from *notSupported* sets the same entry in *pdcch-RACH-SwitchingTime* to a value different from *notSupported* |

Huawei: Suggest also adding

"For each band in a BC, the UE sets *pdcch-RACH-PrepTime-TargetBandList* to the same list of values."

"For each band in a BC, the UE sets *pdcch-RACH-SwitchingTime-TargetBandList* to the same list of values."

An CR will be provided later based on companies’ feedback.

# Conclusion

In this contribution, the following proposals are made:

# References