**3GPP TSG-****RAN WG2 Meeting #118-e R2-220xxxx**

**Online, 09 - 20 May 2022**

**Agenda Item:** 6.0.1

**Source:** Huawei, HiSilicon

**Title:** Summary of offline discussion: [AT118-e][025][NR17] RRC issues (Huawei)

**Document for:** Discussion and decision

# Introduction

This document aims at gathering companies’ views for the following offline discussion:

* [AT118-e][025][NR17] RRC issues (Huawei)

Scope: Treat [R2-2205397](file:///C:\Users\mtk65284\Documents\3GPP\tsg_ran\WG2_RL2\TSGR2_118-e\Docs\R2-2205397.zip), [R2-2205196](file:///C:\Users\mtk65284\Documents\3GPP\tsg_ran\WG2_RL2\TSGR2_118-e\Docs\R2-2205196.zip), [R2-2205684](file:///C:\Users\mtk65284\Documents\3GPP\tsg_ran\WG2_RL2\TSGR2_118-e\Docs\R2-2205684.zip), [R2-2206131](file:///C:\Users\mtk65284\Documents\3GPP\tsg_ran\WG2_RL2\TSGR2_118-e\Docs\R2-2206131.zip), [R2-2205015](file:///C:\Users\mtk65284\Documents\3GPP\tsg_ran\WG2_RL2\TSGR2_118-e\Docs\R2-2205015.zip). Determine agreeable parts, for agreeable parts make agreeable TPs for merge with Rapporteur CR. If modifications from [R2-2205015](file:///C:\Users\mtk65284\Documents\3GPP\tsg_ran\WG2_RL2\TSGR2_118-e\Docs\R2-2205015.zip) are needed also for Rel-16, this need to be a separate CR.

Intended outcome: Report, agreeable TPs for merge with rapporteur CR, agreeable CR(s) if applicable.

Deadline: Schedule 1

## Company contact details

|  |  |  |
| --- | --- | --- |
| Company | Name | E-mail |
| Qualcomm Incorporated | Masato Kitazoe | mkitazoe@qti.qualcomm.com |
|  |  |  |
|  |  |  |
|  |  |  |

# Discussion

## R2-2205397 Discussion on PDCCH adaptation IEs (ePowSav)

The document in [1] is related to RILs N128/Z054/Z055 and discusses a signalling of SearchSpaceSwitchTimer and PDCCH-SkippingDuration, which is currently captured as follows:

SearchSpaceSwitchTimer-r17 ::= INTEGER (1..6400)

PDCCH-SkippingDuration-r17 ::= INTEGER (1..6400)

|  |
| --- |
| ***searchSpaceSwitchTimer***  Timer (in unit of slots) to control the UE behavior to switch from search space group X back to search space group 0, as specified in clause 10 of TS 38.213. A UE does not expect to be configured with Rel-16 SSSG switching parameters and Rel-17 SSSG switching parameters per cell simultaneously. For 15 kHz SCS, {1,2,3,…,20,30, 40, 50, 60, 80, 100} are valid. For 30 kHz SCS, {1,2,3,…,40, 60, 80, 100, 120,160,200} are valid. For 60kHz SCS, {1,2,3,…,80, 120, 160, 200, 240, 320,400} are valid. For 120kHz SCS, {1,2,3,…,160, 240, 320,400, 480, 640,800} are valid. For 480kHz SCS, {4,8,12,…,640, 960, 1280,1600, 1920, 2560,3200} are valid. For 960kHz SCS, {8,16,24,…,1280, 1920, 2560,3200, 3840, 5120,6400} are valid. |
| ***pdcch-SkippingDurationList***  The UE can be configured to be indicated a value of X (i.e., skipping duration), in units of slots, among at most 3 RRC configured values, by scheduling DCIs indicating that PDCCH schedules data. For each skipping duration (i.e. the value range of IE *PDCCH-SkippingDuration-r17*), {1,2,3,…,20,30, 40, 50, 60, 80, 100} are valid for the 15 kHz SCS, {1,2,3,…,40, 60, 80, 100, 120,160,200} are valid for 30 kHz SCS, {1,2,3,…,80, 120, 160, 200, 240, 320,400} are valid for 60kHz SCS, and {1,2,3,…,160, 240, 320,400, 480, 640,800} are valid for 120kHz SCS , {4,8,12,…,640, 960, 1280,1600, 1920, 2560,3200} are valid for 480kHz SCS, and {8,16,24,…,1280, 1920, 2560,3200, 3840, 5120,6400} are valid for 960kHz SCS. |

In [1] it is observed that the way the signalling is done at the moment for these fields leads to a large unnecessary overhead as most of the available codepoints cannot be used in the field configuration. Based on this observation the following options are proposed:

|  |  |  |
| --- | --- | --- |
| **Option 1**: Most straightforward signalling would be to have CHOICE depending on small values or large values. For small values CHOICE for different SCC with different maximum values and for large value common codepoint with scaling fact as how RAN1 have chosen those values (note that the comments in the ASN.1 below illustrate the bit costs of each field):      searchSpaceSwitchTimer-r17          CHOICE { --1 bit        smallValues       CHOICE {                 --2 bits            scs15              INTEGER (1..20),    -- 5 bits            scs30              INTEGER (1..40),    -- 6 bits            scs60              INTEGER (1..80),    -- 7 bits            scs120or480or960   INTEGER (1..160),   -- 8 bits        },        largeValues       ENUMERATED { n30, n40, n50, n60 ,n80, n100 } -- 3 bits      }   |  | | --- | | ***searchSpaceSwitchTimer***  Timer (in unit of slots) to control the UE behavior to switch from search space group 1 or 2 back to search space group 0, as specified in clause 10 of TS 38.213. Network does not configure both Rel-16 SSSG switching parameters and Rel-17 SSSG switching parameters per cell simultaneously. For smallValues, the values in slot are multiplied by 4 for 480kHz SCS and multiplied by 8 for 960kHz SCS. For largeValues, Actual value = field value \* used SCS / 15 kHz, i.e. n30 corresponds to 30 slots for 15kHz SCS, 2\*30 slots for 30kHz SCS, 4\*30 slots for 60kHz SCS, 8\*30 slots for 120kHz SCS, 32\*30 slots for 480kHz SCS and 64\*30 slots for 960kHz SCS, and so on. |   **Option 2:** It would also be possible to have 166 codepoints without distinguishing the SCS and describe in the field description how they are mapped to different values for different SCS:  searchSpaceSwitchTimer-r17 INTEGER (1..166)  - For the first 160 values in 1..160 range, the value applied by UE is CEIL (signalled value \* SCS/120) which results into 20/40/80/160/3200/6400 as maximum values for 15kHz/30kHz/60kHz/120khz/480kHz/960kHz SCS. Note that the CEIL is needed to ensure integer values, and has already been defined in RRC specifications earlier.  - For the last 6 values in 161..166 range, the value applied by UE is SCS/15 \* (30, 40, 50, 60, 80, 100). Note that in this case, since all SCS are multiples of 15 kHz, there are no fractional values possible in this calculation.   |  | | --- | | ***searchSpaceSwitchTimer***  Timer (in unit of slots) to control the UE behavior to switch from search space group 1 or 2 back to search space group 0, as specified in clause 10 of TS 38.213. Network does not configure both Rel-16 SSSG switching parameters and Rel-17 SSSG switching parameters per cell simultaneously. For the first 160 values in 1..160 range, the actual value = CEIL(field value \* SCS/120 kHz). For the last 6 values in 161..166 range, the field values correspond to (30, 40, 50, 60, 80, 100) slots and the actual value = SCS/15 \* (30, 40, 50, 60, 80, 100), i.e. 161 corresponds to 30 slots for 15kHz SCS, 2\*30 slots for 30kHz SCS, 4\*30 slots for 60kHz SCS, 8\*30 slots for 120kHz SCS, 32\*30 slots for 480kHz SCS and 64\*30 slots for 960kHz SCS, and so on.. | |

**Question 1: Do companies agree to redefine signalling design for searchSpaceSwitchTimer and PDCCH-SkippingDuration** **by** **introducing new IE used by both fields as proposed in Option 1 or Option 2?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No, preferred option** | **Justification** |
| Qualcomm Incorporated | Option 2 | Reduce overhead and yet is still simple |
|  |  |  |

[1] provides also a second proposal relating to *searchSpaceSwitchDelay* field:

|  |
| --- |
| **Proposal 2**: introduce new Rel-17 field for *searchSpaceSwitchDelay* with either extending the values or scaling the current values based on SCS e.g. multiplied by 4 and 8 for 480kHz and 960kHz SCS based on RAN1 outcome. |

Since the change will have to take place anyway during this meeting, companies are invited to present their tentative views, under the assumption that the final decision will have to be made based on the RAN1 conclusion.

**Question 2: Do companies agree to introduce new Rel-17 field for searchSpaceSwitchDelay with either extending the values or scaling the current values based on SCS e.g. multiplied by 4 and 8 for 480kHz and 960kHz SCS based on RAN1 outcome?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No, preferred option** | **Justification** |
| Qualcomm Incorporated | Yes, scaling | Simpler to apply scaling multipliers for the new SCSes |
|  |  |  |

## R2-2205196 Discussion on RIL issue E133 (ePowSav, 71 GHz)

The following RIL has been submitted:

OPTIONAL, -- Need M

searchSpaceSwitchTimer-r17 INTEGER (1..800) OPTIONAL, -- Need R

pdcch-SkippingDurationList-r17 SEQUENCE(SIZE (1..3)) OF PDCCH-SkippingDuration-r17 OPTIONAL -- Need R

]]

In [2], this topic is further discussed. The original intention of the RIL was to analyse whether the *searchSpaceSwitchTimer* parameter can be reused for both ePowSav and 71 GHz, but it seems that in [2] the submitting company concluded that it would be hard to reuse the same type for both parameters due to, e.g. different value ranges. Hence, it is only proposed to extend the value range of *searchSpaceSwitchTimer-r16* from *PDCCH-ServingCellConfig* in the following way (as in the RRC rapporteur CR for 71 GHz [3]):

*PDCCH-ServingCellConfig* information element

-- ASN1START

-- TAG-PDCCH-SERVINGCELLCONFIG-START

PDCCH-ServingCellConfig ::= SEQUENCE {

slotFormatIndicator SetupRelease { SlotFormatIndicator } OPTIONAL, -- Need M

...,

[[

availabilityIndicator-r16 SetupRelease {AvailabilityIndicator-r16} OPTIONAL, -- Need M

searchSpaceSwitchTimer-r16 INTEGER (1..80) OPTIONAL -- Need R

]],

[[

searchSpaceSwitchTimer-v17xy INTEGER (81..1280) OPTIONAL -- Need R

]]

}

-- TAG-PDCCH-SERVINGCELLCONFIG-STOP

-- ASN1STOP

|  |
| --- |
| *PDCCH-ServingCellConfig* field descriptions |
| ***availabilityIndicator***  Use to configure monitoring a PDCCH for Availability Indicators (AI). |
| ***searchSpaceSwitchTimer***  The value of the timer in slots for monitoring PDCCH in the active DL BWP of the serving cell before moving to the default search space group (see TS 38.213 [13], clause 10.4).  For 15 kHz SCS, {1..20} are valid.  For 30 kHz SCS, {1..40} are valid.  For 60 kHz SCS, {1..80} are valid.  For 120 kHz SCS, {1..160} are valid.  For 480 kHz SCS, {1..640} are valid.  For 960 kHz SCS, {1..1280} are valid.  The network configures the same value for all serving cells in the same *CellGroupForSwitch*. |
| ***slotFormatIndicator***  Configuration of Slot-Format-Indicators to be monitored in the correspondingly configured PDCCHs of this serving cell. |

Based on this, the following question is asked:

**Question 3: Do companies agree to extend the value range of searchSpaceSwitchTimer-r16 from PDCCH-ServingCellConfig, as proposed in** **R2-2205188?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No, preferred option** | **Justification** |
| Qualcomm Incorporated | Yes | Similar extensions have been made to other IEs whose values depend on SCS. This IE was forgotten by mistake. |
|  |  |  |

## R2-2205684 Discussion on ul-AccessConfigListDCI (RIL A402, A405) (IIOT, 71 GHz)

In [4] it is indicated that after introduction of the Rel-17 versions of ul-AccessConfigListDCI-1-2, ul-AccessConfigListDCI-1-1 as well as ul-AccessConfigListDCI-0-1, ul-AccessConfigListDCI-0-2 fields, the interpretation of the field description became cumbersome. Furthermore, it is unclear in which frequency ranges the fields can be applied. The following clarifications are then proposed:

## Text Proposal 1

START OF CHANGES

### 6.3.2 Radio resource control information elements

< Unchanged parts omitted >

***PUCCH-Config* field descriptions**

|  |
| --- |
| **ul-AccessConfigListDCI-1-1, ul-AccessConfigListDCI-1-2**  List of the combinations of cyclic prefix extension and UL channel access type (see TS 38.212 [17], clause 7.3.1) applicable, respectively, to DCI format 1\_1 and DCI format 1\_2. The fields ul-AccessConfigListDCI-1-1-r16 and ul-AccessConfigListDCI-1-2-r17 are only applicable for FR1 (see TS 38.212 [17], Table 7.3.1.2.2-6). The field ul-AccessConfigListDCI-1-1-r17 indicates a list which only contains UL channel access types and is only applicable for FR2-2 (see TS 38.212 [17], Table 7.3.1.2.2-6A). |

< Unchanged parts omitted >

END OF CHANGES

## Text Proposal 2

START OF CHANGES

### 6.3.2 Radio resource control information elements

< Unchanged parts omitted >

***PUSCH-Config* field descriptions**

|  |
| --- |
| ***ul-AccessConfigListDCI-0-1, ul-AccessConfigListDCI-0-2***  List of the combinations of cyclic prefix extension, channel access priority class (CAPC), and UL channel access type (see TS 38.212 [17], clause 7.3.1) applicable for DCI format 0\_1 and DCI format 0\_2, respectively. The fields ul-AccessConfigListDCI-0-1-r16 and ul-AccessConfigListDCI-0-2-r17 are only applicable for FR1 (see TS 38.212 [17], Table 7.3.1.1.2-35). The field *ul-AccessConfigListDCI-0-1-r17* only contains a list of UL channel access types and is only applicable for FR2-2 (see TS 38.212 [17], Table 7.3.1.1.2-35A). |

**Question 4: Do companies agree with the changes proposed in Text Proposal 1 above?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Qualcomm Incorporated | Yes |  |
|  |  |  |

**Question 5: Do companies agree with the changes proposed in Text Proposal 2 above?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Qualcomm Incorporated | Yes |  |
|  |  |  |

## R2-2206131 Discussion on ul-AccessConfigListDCI PDSCH and PUSCH TDRA configuration (RIL: Q300, E057) (CovEnh, 71 GHz)

The document in [5] is related to the following RIL issues:

|  |
| --- |
| **[RIL]**: Q300 **[Delegate]**: Qualcomm (Umesh) **[WI]**: 71GHz **[Class]**: 2 **[Status]**: ToDo **[TDoc]**: None **[Proposed Conclusion]**:  **[Description]**: Extended k0 in PDSCH-TimeDomainResourceAllocation  **[Proposed Change]**: The only difference between r16 and r17 seems to be the range of k0. Then it is unclear why -r17 needs to be introduced instead of simply adding NCE for k0-v1700 for the extended range.  Easier to simply add k0-v1700 field in -r16 IE, unless a clear need for new IE is seen. This also has impact on merging with MBS.  Related to Q301 and Q302  **[Comments]**:  **[RIL]**: E057 **[Delegate]**: Ericsson (Jonas) **[WI]**: MULTI **[Class]**: 2 **[Status]**: ToDo **[TDoc]**: R2-22xxxx **[Proposed Conclusion]**:  **[Description]**: The current way CE parameters have been implemented are not very clean and can be done in a better way.  **[Proposed Change]**: Add CE parameters numberOfRepetition and numberOfSlots-TBoMS under PUSCH-Allocation-r17 and make PUSCH-Allocation-r16 optional. Then we need to consider k2-r17 whether the condition should remain.  **[Comments]**: |

The tentative conclusions from the ASN.1 review ad-hoc meeting are as follows:

|  |
| --- |
| PUSCH-TimeDomainResourceAllocationList merging issue  [R2-2204346](file:///C:\Users\mtk65284\Documents\3GPP\tsg_ran\WG2_RL2\TSGR2_118\Docs\R2-2204346.zip) [E057] Coverage enhancement TDRA table Ericsson discussion NR\_cov\_enh   * Noted   DISCUSSION   * MTK are ok with proposal but would like to avoid reuse of IE with same ranges, i.e. can have CE field but should not duplicate the sub-fields, can refer to IE’s instead.   [R2-2204341](file:///C:\Users\mtk65284\Documents\3GPP\tsg_ran\WG2_RL2\TSGR2_118\Docs\R2-2204341.zip) PDSCH-TimeDomainResourceAllocationList and PUSCH-TimeDomainResourceAllocationList merging issue (RIL: Q300, E057) Huawei, HiSilicon discussion Rel-17 NR\_ext\_to\_71GHz-Core, NR\_cov\_enh-Core   * Noted   DISCUSSION   * Ericsson think that k2-r17 is not only for multiPUSCH. * Intel think that k2 is anyway different, should add a qualifier somehow, * Nokia would like to think a bit more * QC agrees with the proposal to add Multi- to the lists. * Rename k2-r17 to something else to differentiate it from k2-r16.   *Chair: There is clear interest for further clarifications on TDRA IEs and structure, but companies seems not ready for agreement. Consider for R2 118-e*  PDSCH-TimeDomainResourceAllocationList merging issue  [R2-2204301](file:///C:\Users\mtk65284\Documents\3GPP\tsg_ran\WG2_RL2\TSGR2_118\Docs\R2-2204301.zip) PDSCH-TimeDomainResourceAllocationList merging issue [Q300] [Q301] [Q302] Qualcomm Incorporated discussion Rel-17 NR\_ext\_to\_71GHz-Core, NR\_MBS-Core   * Noted   P1   * Ericsson prefer to keep the current design. * Huawei think we attempt to do non-critical extension. Nokia agrees. Intel MTK agrees. * [Q300] Extend k0-r16 instead of introducing PDSCH-TimeDomainResourceAllocation-r17 Adopt changes shown in section 3.2. * [Q302] Remove last sentence in *repetitionNumber* field description and update the conditional presence table, as shown in section 3.1. * P2 no change needed (r16 version intended). |

In [5], further modifications of TDRA configurations are proposed for both PDSCH and PUSCH and the TPs can be found in [5].

The proposed changes for PDSCH TDRA are summarized as follows:

**Proposal 1.1: In PDSCH-TimeDomainResourceAllocationList IE:**

* 1. **To avoid confusion with Rel-16 fields/types, PDSCH-TimeDomainResourceAllocationList-r17 is renamed as MultiPDSCH-TimeDomainResourceAllocationList-r17 and pdsch-AllocationList-r17 is renamed as pdsch-TimeDomainResourceAllocationList-r17.**

**Proposal 1.2 In PDSCH-Config IE:**

1. **Replace PDSCH-TimeDomainResourceAllocationList-r17 with MultiPDSCH-TimeDomainResourceAllocationList-r17**

**Question 6: Do companies agree with the proposals above for PDSCH TDRA signalling changes?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Qualcomm Incorporated | Yes | Adding “Multi” as shown above makes it clearer.  No strong view on renaming of pdsch-AllocationList-r17 to pdsch-TimeDomainResourceAllocationList-r17 |
|  |  |  |

The proposed changes for PUSCH TDRA are summarized as follows:

**Proposal 2.1 In PUSCH-TimeDomainResourceAllocation IE:**

1. **Rename k2-r17 to something different than k2-Ext-r17 to better differentiate it from k2-r16 (e.g. k2PerPUSCH-Allocation-r17).**
2. **Add k2PerPUSCH-Allocation-r17 to PUSCH-Allocation-r16.**
3. **Add a separate field description for k2PerPUSCH-Allocation-r17.**
4. **Clarify that k2 is not present/ignored in case k2PerPUSCH-Allocation-r17 is configured.**
5. **Remove PUSCH-TimeDomainResourceAllocationList-r17, PUSCH-TimeDomainResourceAllocation-r17 and PUSCH-Allocation-r17.**

**Proposal 2.2: In PUSCH-Config IE:**

1. **Remove pusch-TimeDomainAllocationListForMultiPUSCH-r17, pusch-TimeDomainAllocationListDCI-0-2-r17, pusch-TimeDomainAllocationListDCI-0-1-r17.**

**Question 7: Do companies agree with the proposals above for PUSCH TDRA signalling changes?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Qualcomm Incorporated | Yes | Minor: extra comma at the end of field k2PerPUSCH-Allocation-r17 should be removed.  k2PerPUSCH-Allocation-r17 INTEGER (0..128) OPTIONAL, -- Cond MultiPUSCH |
|  |  |  |

## R2-2205015 [H634] Correction for the need code and conditions for optional fields in PC5 RRC message (SL enh, SL Relay)

This topic has been discussed during the ASN.1 ad-hoc meeting with the following conclusion:

Need Codes and optional fields for PC5

[R2-2204321](file:///C:\Users\mtk65284\Documents\3GPP\tsg_ran\WG2_RL2\TSGR2_118\Docs\R2-2204321.zip) [H634] Correction for the need code and conditions for optional fields in PC5 RRC message Huawei, HiSilicon draftCR Rel-17 38.331 17.0.0 F NR\_SL\_relay-Core, NR\_SL\_enh-Core

* Noted

DISCUSSION

* Lenovo think indeed need codes are used, so it seems useful to have clarifications, but maybe this should be for Rel-16. OPPO agrees, think something should be introduced for Rel-16, need time to check.
* HW agree that we should correct for Rel-16.
* QC support to do this.
* MTK agree in general, but need to check.
* Intel think that we should add PC5 to title rather than remove
* SS wonder if applicable to LTE. Oppo think that LTE only have sbcch. Apple: No impact on LTE
* Ericsson would like to consider a new section for PC5
* Will update general text for need code and conditions for optional fields for PC5, likely from R16, treat further at next meeting (not urgent, can even treat in Q3)

The feedback towards the proposed changes was favourable, so it is proposed to discuss further details, i.e. whether the TP in [6] is OK and whether the changes should be applied from Rel-16 or from Rel-17.

**Question 8: Please provide comments towards the CR in R2-2205015, if any.**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Qualcomm Incorporated | We support the CR. |
|  |  |

**Question 9: Do you think the changes should be applied from Rel-16 or only from Rel-17?**

|  |  |  |
| --- | --- | --- |
| **Company** | **R16 / R17** | **Comments** |
| Qualcomm Incorporated | R16 |  |
|  |  |  |

# Conclusion

TBD

# References

1. R2-2205397 Discussion on PDCCH adaptation IEs (related to N128/Z054/Z055) Nokia, Nokia Shanghai Bell
2. R2-2205196 Discussion on RIL issue E133 Ericsson
3. R2-2205188 RRC correction CR for 71 GHz Ericsson
4. R2-2205684 Discussion on ul-AccessConfigListDCI (RIL A402, A405) Apple
5. R2-2206131 PDSCH and PUSCH TDRA configuration (RIL: Q300, E057) Huawei, HiSilicon
6. R2-2205015 [H634] Correction for the need code and conditions for optional fields in PC5 RRC message, Huawei, HiSilicon