3GPP TSG-RAN WG1 Meeting #113 R1-23xxxxx

Incheon, Korea, May 22nd – 26th 2023

Agenda Item: 9.17

Source: Ericsson

Title: FL Summary#1 - Higher layer signaling for single DCI scheduling non-consecutive PUSCHs in FR1

Document for: Discussion, Decision

# Introduction

The following TEI was endorsed during the last meeting.

**Endorsed TEI:**

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| **Agreement**  Introduce UE feature(s) for multi-PUSCH scheduling with single DCI 0\_1 for non-contiguous slots in FR1 for all defined SCSs   * Note: there is no RAN1 impact |

This document is intended to facilitate the discussions regarding RRC parameter for the endorsed TEI in last meeting under the following email discussion, task by Chair.

[113-R18-Others-01] Email discussion on higher layer signalling for eDSS, NCR, MC-Enh, BWP without restriction, and endorsed TEIs – Nan (ZTE) - To be used for coordinating discussions in the draft folder

For the endorsed TEI, the proponent has provided initial suggestion for corresponding higher layer parameters in [1], that is used as the input for the discussion.

# Discussion

It is explained in [1], the background and motivation for the proposed RRC as the following:

The extension in Rel-17 to non-contiguous slots was enabled by extendedK2 as shown below

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| -- ASN1START  -- TAG-PUSCH-TIMEDOMAINRESOURCEALLOCATIONLIST-START  PUSCH-TimeDomainResourceAllocationList ::= SEQUENCE (SIZE(1..maxNrofUL-Allocations)) OF PUSCH-TimeDomainResourceAllocation  PUSCH-TimeDomainResourceAllocation ::= SEQUENCE {  k2 INTEGER(0..32) OPTIONAL, -- Need S  mappingType ENUMERATED {typeA, typeB},  startSymbolAndLength INTEGER (0..127)  }  PUSCH-TimeDomainResourceAllocationList-r16 ::= SEQUENCE (SIZE(1..maxNrofUL-Allocations-r16)) OF PUSCH-TimeDomainResourceAllocation-r16  PUSCH-TimeDomainResourceAllocation-r16 ::= SEQUENCE {  k2-r16 INTEGER(0..32) OPTIONAL, -- Need S  puschAllocationList-r16 SEQUENCE (SIZE(1..maxNrofMultiplePUSCHs-r16)) OF PUSCH-Allocation-r16,  ...  }  PUSCH-Allocation-r16 ::= SEQUENCE {  mappingType-r16 ENUMERATED {typeA, typeB} OPTIONAL, -- Cond NotFormat01-02-Or-TypeA  startSymbolAndLength-r16 INTEGER (0..127) OPTIONAL, -- Cond NotFormat01-02-Or-TypeA  startSymbol-r16 INTEGER (0..13) OPTIONAL, -- Cond RepTypeB  length-r16 INTEGER (1..14) OPTIONAL, -- Cond RepTypeB  numberOfRepetitions-r16 ENUMERATED {n1, n2, n3, n4, n7, n8, n12, n16} OPTIONAL, -- Cond Format01-02  ...,  [[  numberOfRepetitionsExt-r17 ENUMERATED {n1, n2, n3, n4, n7, n8, n12, n16, n20, n24, n28, n32, spare4, spare3, spare2,  spare1} OPTIONAL, -- Cond Format01-02-For-TypeA  numberOfSlotsTBoMS-r17 ENUMERATED {n1, n2, n4, n8, spare4, spare3, spare2, spare1} OPTIONAL, -- Need R  extendedK2-r17 INTEGER (0..128) OPTIONAL -- Cond MultiPUSCH  ]]  }  -- TAG-PUSCH-TIMEDOMAINRESOURCEALLOCATIONLIST-STOP  -- ASN1STOP |
| ***extendedK2***  Corresponds to L1 parameter 'K2' (see TS 38.214 [19], clause 6.1.2.1) configurable per PUSCH allocation. Only values {0..32} are applicable for PUSCH SCS of 120 kHz.  When the field is absent for the first PUSCH if multiple PUSCH are configured per PDCCH, or when the field is absent and only one PUSCH is configured per PDCCH, the UE applies the value 1 when PUSCH SCS is 15/30 kHz; the value 2 when PUSCH SCS is 60 kHz, the value 3 when PUSCH SCS is 120 kHz, the value 11 when PUSCH SCS is 480 kHz, and the value 21 when PUSCH SCS is 960 kHz. |

It is proposed to provide the information to RAN2 to make necessary changes such that this parameter can be applied for Rel-18 for operation in FR1. Please note that the maximum range value is suggested to be reduced for FR1. **Table 1 provides the proposed higher layer parameters for convenience (This table is the same as the Excel Sheet attached in [1]).**

**Proposal 1:**

Table 1 provides the higher layer parameter for enabling in FR1 scheduling multiple PUSCHs on non-consecutive slots by a single DCI format 0\_1.

Table 1

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| **WI code** | **Sub-feature group** | **RAN1 specification** | **Section** | **RAN2 Parent IE** | **RAN2 ASN.1 name** | **Parameter name in the spec** | **New or existing?** | **Parameter name in the text** | **Description** | **Value range** | **Default value aspect** | **Per (UE, cell, TRP, …)** | **Required for initial access or IDLE/INACTIVE** | **Specification** | **Comment** |
| TEI18 | Multiple PUSCHs scheduling by single DCI for non-consecutive slots in FR1 | 38.214 |  | PUSCH-TimeDomainResourceAllocationList |  | extendedK2 | Up to RAN2 |  | See comment in Column (P). | {0, .., 32} |  | Per UE |  | 38.331 | Multiple PUSCHs scheduled by a single DCI format 0\_1 in Rel-17 is enabled on non-consecutive slots by extendedK2-r17. However, the applicability to non-consecutive slots is permitted in Rel-17 only in FR2-1/FR2-2. Based on the Rel-18 TEI agreement below , this feature is addiitonally enabled this for FR1 in Rel-18. It is up to RAN2 how to implement the agreement below. Please note that this row suggests a smaller range value, i.e. {0, ... . 32} for extendedK2 for FR1 as compared to Rel-17. **Agreement** Introduce UE feature(s) for multi-PUSCH scheduling with single DCI 0\_1 for non-contiguous slots in FR1 for all defined SCSs - Note: there is no RAN1 impact |

## Initial Discussion

**Question:** Please provide your view, on Proposal 1 and the suggested RRC parameter in Table 1, whether it can be supported or not. If there is concern, please indicate the reason and suggestions to improve.

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| **Company** | **Comment** |
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# Conclusion

TBD

# References

1. R1-2305716 , Higher layer signaling for NR Rel-18, Ericsson