**3GPP TSG RAN WG1#102-e draftR1-200**

**e-Meeting, August 17th – 28th, 2020**

**Agenda Item: 7.2.2.1.2**

**Source: Moderator (Lenovo)**

**Title: Summary of Email discussion [102-e-NR-unlic-NRU-DL\_Signals\_and\_Channels-03] to capture earlier agreements and align specifications**

**Document for: Discussion, Decision**

# Scope and issues based on company submissions

According to the guidance by RAN1 (vice-)chairman, this email discussion to approve TPs is to be finalised by **20 August**.

# Summary of Discussion and Suggestions

Regarding IE Names in DCI format 2\_0, there is consensus to adopt ZTE's TP#3 in R1-2005598.

Regarding how to capture RRC parameter *subcarrierSpacing-r16*, there is consensus to adopt a description similar to the suggestion by Sharp's TP #3 in R1-2006553, however as a subbullet of *CO-DurationPerCell-r16*. A corresponding TP should be drafted and adopted.

Regarding the parameter correction for CSI-RS reception, there is consensus to adopt Sharp's TP#7 in R1-2006553.

Regarding the processing time for SSSG switching, there is no consensus whether ZTE's TP is required or not, even though some change/clarification is seen as necessary by several companies. Discussion could continue based on the following TP:

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| -------------------------------- < Start of TP for Clause 10.4 of 38.213> ----------------------------------< Unchanged parts are omitted >A UE can be provided by *searchSpaceSwitchingDelay-r16* a number of symbols $P\_{switch}$ where a minimum value of $P\_{switch}$ is provided in Table 10.4-1 for UE processing capability 1 and UE processing capability 2 and SCS configuration $μ$.UE processing capability 1 for SCS configuration $μ$ applies unless a UE indicates support of UE processing capability 2. Table 10.4-1: Minimum value of $P\_{switch}$ [symbols]

|  |  |  |
| --- | --- | --- |
| $$μ$$ | Minimum $P\_{switch}$ value for UE processing capability 1 [symbols] | Minimum $P\_{switch}$ value for UE processing capability 2 [symbols] |
| 0 | 25 | 10 |
| 1 | 25 | 12 |
| 2 | 25 | 22 |

< Unchanged parts are omitted > |

focussing on a clarification that UE processing capability 1 applies unless capability 2 is indicated and configured.

## TP#A for 38.212 (IE Names in DCI format 2\_0)

**Reasons for change:**

The parameter names in the description of DCI format 2\_0 are not aligned with corresponding names in 38.331.

**Summary of changes:**

1. Change *availableRB-SetPerCell-r16* to *availableRB-SetsToAddModList-r16*
2. Change *CO-DurationPerCell-r16* to *co-DurationsPerCellToAddModList-r16*
3. Change *searchSpaceSwitchTrigger-r16* to *searchSpaceSwitchTriggerToAddModList-r16*

**Specs/clauses affected:**

TS 38.212 clause 7.3.1.3.1

**Consequences if not approved:**

Unaligned parameter names in 38.212 and 38.331.

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| 7.3.1.3.1 Format 2\_0DCI format 2\_0 is used for notifying the slot format, COT duration, available RB set, and search space set group switching. The following information is transmitted by means of the DCI format 2\_0 with CRC scrambled by SFI-RNTI:- If the higher layer parameter *slotFormatCombToAddModList* is configured, - Slot format indicator 1, Slot format indicator 2, …, Slot format indicator *N*, - If the higher layer parameter *availableRB-SetsToAddModList-r16* is configured, - Available RB set Indicator 1, Available RB set Indicator 2, …, Available RB set Indicator *N1*, - If the higher layer parameter *co-DurationsPerCellToAddModList-r16* is configured- COT duration indicator 1, COT duration indicator 2, …, COT duration indicator *N2.*- If the higher layer parameter *searchSpaceSwitchTriggerToAddModList-r16* is configured- Search space set group switching flag 1, Search space set group switching flag 2, …, Search space set group switching flag *M.*The size of DCI format 2\_0 is configurable by higher layers up to 128 bits, according to Clause 11.1.1 of [5, TS 38.213]. |

## TP#B for 38.213 (Capturing RRC parameter *subcarrierSpacing-r16*)

**Reasons for change:**

The reference SCS configuration for determining remaining channel occupancy duration is missing from the list of parameters with which the UE can be provided.

**Summary of changes:**

1. Add *subcarrierSpacing-r16* to the list of parameters being provided

**Specs/clauses affected:**

TS 38.213 clause 11.1.1

**Consequences if not approved:**

Incomplete specification of determining a remaining channel occupancy duration.

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| 11.1.1 UE procedure for determining slot format**<omitted>**For each serving cell in the set of serving cells, the UE can be provided: - an identity of the serving cell by *servingCellId*- a location of a SFI-index field in DCI format 2\_0 by *positionInDCI*- a set of slot format combinations by *slotFormatCombinations*, where each slot format combination in the set of slot format combinations includes - one or more slot formats indicated by a respective *slotFormats* for the slot format combination, and - a mapping for the slot format combination provided by *slotFormats* to a corresponding SFI-index field value in DCI format 2\_0 provided by *slotFormatCombinationId*- for unpaired spectrum operation, a reference SCS configuration  by *subcarrierSpacing* and, when a supplementary UL carrier is configured for the serving cell, a reference SCS configuration  by *subcarrierSpacing2* for the supplementary UL carrier- for paired spectrum operation, a reference SCS configuration  for a DL BWP by *subcarrierSpacing* and a reference SCS configuration  for an UL BWP by *subcarrierSpacing2*- a location of an available RB set indicator field in DCI format 2\_0 that is - one bit, if *intraCellGuardBandDL-r16* for the serving cell indicates no intra-cell guard-bands are configured, where a value of '1' indicates that the serving cell is available for receptions, a value of '0' indicates that the serving cell is not available for receptions, by *availableRB-SetPerCell-r16*, and the serving cell remains available or unavailable for reception until the end of the indicated channel occupancy duration- a bitmap having a one-to-one mapping with the RB sets [6, TS 38.214] of the serving cell, if *intraCellGuardBandDL-r16* for the serving cell indicates intra-cell guard-bands are configured, where the bitmap includes $N\_{RB,set,DL}$ bits and $N\_{RB,set,DL}$ is the number of RB sets in the serving cell, a value of '1' indicates that an RB set is available for receptions, a value of '0' indicates that an RB set is not available for receptions, by *availableRB-SetPerCell-r16* and a RB set remains available or unavailable for receptions until the end of the indicated channel occupancy duration- a location of a channel occupancy duration field in DCI format 2\_0, by *CO-DurationPerCell-r16*, that indicates a remaining channel occupancy duration for the serving cell starting from a first symbol of a slot where the UE detects the DCI format 2\_0 by providing a value from *CO-DurationList-r16*. The channel occupancy duration field includes $max\left\{\left⌈log\_{2}\left(COdurationListSize\right)\right⌉,1\right\}$ bits, where $COdurationListSize$ is the number of values provided by *CO-DurationList-r16*. If *CO-DurationPerCell-r16* is not provided, the remaining channel occupancy duration for the serving cell is a number of slots, starting from the slot where the UE detects the DCI format 2\_0, that the SFI-index field value provides corresponding slot formats- a reference SCS configuration for the list of Channel Occupancy durations, by *subcarrierSpacing-r16*- a location of a search space set group switching flag field in DCI format 2\_0, by *SearchSpaceSwitchTrigger-r16*, that indicates a group from two groups of search space sets for PDCCH monitoring for scheduling on the serving cell as described in Clause 10.4.**<omitted>** |

## TP#C for 38.213 (Parameter correction for CSI-RS reception)

**Reasons for change:**

The parameter name for slot format determination in 38.213 is not aligned with the corresponding name in 38.331.

**Summary of changes:**

1. Change *SlotFormatIndicator* to *SlotFormatCombinationsPerCell*

**Specs/clauses affected:**

TS 38.213 clause 11.1.1

**Consequences if not approved:**

Unaligned parameter names in 38.213 and 38.331.

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| 11.1.1 UE procedure for determining slot format**<omitted>**For operation with shared spectrum channel access, if a UE is configured by higher layers to receive a CSI-RS and the UE is provided *CO-DurationPerCell-r16* and is not provided *SlotFormatCombinationsPerCell*, for a set of symbols of a slot that are indicated as downlink or flexible by *tdd-UL-DL-ConfigurationCommon* or *tdd*-*UL-DL-ConfigurationDedicated*, or when *tdd-UL-DL-ConfigurationCommon* and *tdd*-*UL-DL-ConfigurationDedicated* are not provided, the UE cancels the CSI-RS reception in the set of symbols of the slot that are not within the indicated remaining channel occupancy duration.**<omitted>** |

## TP#D for 38.213 (Processing time for switching)

**Reasons for change:**

It is unclear which minimum value for switching search space set groups applies as a function of indicated UE capability.

**Summary of changes:**

1. Change description to clarify that UE processing capability 1 applies unless UE indicates support of UE processing capability 2.

**Specs/clauses affected:**

TS 38.213 clause 10.4

**Consequences if not approved:**

Unclear description of applicable minimum switching time and corresponding UE capability.

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| 10.4 Search space set group switching**<omitted>**A UE can be provided by *searchSpaceSwitchingDelay-r16* a number of symbols $P\_{switch}$ where a minimum value of $P\_{switch}$ is provided in Table 10.4-1 for UE processing capability 1 and UE processing capability 2 and SCS configuration $μ$.UE processing capability 1 for SCS configuration $μ$ applies unless a UE indicates support of UE processing capability 2. Table 10.4-1: Minimum value of $P\_{switch}$ [symbols]

|  |  |  |
| --- | --- | --- |
| $$μ$$ | Minimum $P\_{switch}$ value for UE processing capability 1 [symbols] | Minimum $P\_{switch}$ value for UE processing capability 2 [symbols] |
| 0 | 25 | 10 |
| 1 | 25 | 12 |
| 2 | 25 | 22 |

**<omitted>** |  |

# Prior Agreements and Discussion

## IE Names in DCI 2\_0

ZTE includes the following proposal and TP in R1-2005598:

**Proposal 5: The child IEs (availableRB-SetPerCell-r16, CO-DurationPerCell-r16 and searchSpaceSwitchTrigger-r16) quoted in the definition of DCI format 2\_0 in TS 38.212 should be replaced by the parent IEs (*xxxToAddModList-r16*). The TP#3 can be adopted.**

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| ----------------------------- < Start of TP#3 for Clause 7.3.1.3.1of 38.212 [4]> -------------------------------7.3.1.3.1 Format 2\_0DCI format 2\_0 is used for notifying the slot format, COT duration, available RB set, and search space set group switching. The following information is transmitted by means of the DCI format 2\_0 with CRC scrambled by SFI-RNTI:- If the higher layer parameter *slotFormatCombToAddModList* is configured, - Slot format indicator 1, Slot format indicator 2, …, Slot format indicator *N*, - If the higher layer parameter *~~availableRB-SetPerCell-r16~~availableRB-SetsToAddModList-r16* is configured, - Available RB set Indicator 1, Available RB set Indicator 2, …, Available RB set Indicator *N1*, - If the higher layer parameter *~~CO-DurationPerCell-r16~~co-DurationsPerCellToAddModList-r16* is configured- COT duration indicator 1, COT duration indicator 2, …, COT duration indicator *N2.*- If the higher layer parameter *~~searchSpaceSwitchTrigger-r16~~**searchSpaceSwitchTriggerToAddModList-r16* is configured- Search space set group switching flag 1, Search space set group switching flag 2, …, Search space set group switching flag *M.*The size of DCI format 2\_0 is configurable by higher layers up to 128 bits, according to Clause 11.1.1 of [5, TS 38.213].-------------------------------------------- < End of text proposal> ------------------------------------------------ |

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| **Q1: Do you agree with the proposal/TP by ZTE?** |
| **Company** | **Comment** |
| Qualcomm | Agree |
| LG Electronics | Agree |
| Huawei, HiSilicon | Agree |
| Samsung | Agree |
| Sharp | Agree |
| Nokia, NSB | Agree |
| ZTE, Sanechips | Agree |
| Spreadtrum | Agree |
| vivo | Agree |

## Capturing RRC parameter *subcarrierSpacing-r16*

Sharp includes the following in R1-2006553:

**Proposal 3:**

* **TS38.213 to implement subcarrierSpacing configuration for CO duration indication.**
	+ **Adopt the following Text proposal #3.**

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| **Text proposal #3**--------- beginning of text proposal for TS 38.213 11.1.1 UE procedure for determining slot format**<omitted>**For each serving cell in the set of serving cells, the UE can be provided: - an identity of the serving cell by *servingCellId*- a location of a SFI-index field in DCI format 2\_0 by *positionInDCI*- a set of slot format combinations by *slotFormatCombinations*, where each slot format combination in the set of slot format combinations includes - one or more slot formats indicated by a respective *slotFormats* for the slot format combination, and - a mapping for the slot format combination provided by *slotFormats* to a corresponding SFI-index field value in DCI format 2\_0 provided by *slotFormatCombinationId*- for unpaired spectrum operation, a reference SCS configuration  by *subcarrierSpacing* and, when a supplementary UL carrier is configured for the serving cell, a reference SCS configuration  by *subcarrierSpacing2* for the supplementary UL carrier- for paired spectrum operation, a reference SCS configuration  for a DL BWP by *subcarrierSpacing* and a reference SCS configuration  for an UL BWP by *subcarrierSpacing2*- a location of an available RB set indicator field in DCI format 2\_0 that is - one bit, if *intraCellGuardBandDL-r16* for the serving cell indicates no intra-cell guard-bands are configured, where a value of '1' indicates that the serving cell is available for receptions, a value of '0' indicates that the serving cell is not available for receptions, by *availableRB-SetPerCell-r16*, and the serving cell remains available or unavailable for reception until the end of the indicated channel occupancy duration- a bitmap having a one-to-one mapping with the RB sets [6, TS 38.214] of the serving cell, if *intraCellGuardBandDL-r16* for the serving cell indicates intra-cell guard-bands are configured, where the bitmap includes $N\_{RB,set,DL}$ bits and $N\_{RB,set,DL}$ is the number of RB sets in the serving cell, a value of '1' indicates that an RB set is available for receptions, a value of '0' indicates that an RB set is not available for receptions, by *availableRB-SetPerCell-r16* and a RB set remains available or unavailable for receptions until the end of the indicated channel occupancy duration- a location of a channel occupancy duration field in DCI format 2\_0, by *CO-DurationPerCell-r16*, that indicates a remaining channel occupancy duration for the serving cell starting from a first symbol of a slot where the UE detects the DCI format 2\_0 by providing a value from *CO-DurationList-r16*. The channel occupancy duration field includes $max\left\{\left⌈log\_{2}\left(COdurationListSize\right)\right⌉,1\right\}$ bits, where $COdurationListSize$ is the number of values provided by *CO-DurationList-r16*. If *CO-DurationPerCell-r16* is not provided, the remaining channel occupancy duration for the serving cell is a number of slots, starting from the slot where the UE detects the DCI format 2\_0, that the SFI-index field value provides corresponding slot formats- a reference SCS configuration for the list of Channel Occupancy durations, by *subcarrierSpacing-r16*- a location of a search space set group switching flag field in DCI format 2\_0, by *SearchSpaceSwitchTrigger-r16*, that indicates a group from two groups of search space sets for PDCCH monitoring for scheduling on the serving cell as described in Clause 10.4. |

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| **Q2: Please provide your view on Sharp's proposal/TP.** |
| **Company** | **Comment** |
| Qualcomm | Agree in general, but might be better to put this as a sub-bullet of *CO-DurationPerCell-r16*. |
| LG Electronics | Agree, but as Qualcomm pointed out, instead of having separate bullet, it can be merged with the above bullet describing *CO-DurationPerCell-r16*. |
| Huawei, HiSilicon | Agree with the intention. It should be differentiated from the existing reference SCS for SFI |
| Samsung | Agree with Qualcomm |
| Sharp | This change is necessary. We are fine to move it to a sub-bullet of *CO-DurationPerCell-r16*. |
| Nokia, NSB | OK with QC proposal |
| ZTE, Sanechips | Agree with Qualcomm’s proposal. |
| Spreadtrum | Agree with Qualcomm’s proposal. |
| vivo | Agree with Qualcomm’s proposal. |

## Parameter correction for CSI-RS reception

Sharp includes the following proposal and TP in R1-2006553:

**Proposal 7:**

* ***SlotFormatCombinationsPerCell* should be referred to for determination of whether or not SFI is configured.**
	+ **Adopt the following Text proposal #7.**

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| **Text proposal #7**--------- beginning of text proposal for TS 38.213 11.1.1 UE procedure for determining slot format**<omitted>**For operation with shared spectrum channel access, if a UE is configured by higher layers to receive a CSI-RS and the UE is provided *CO-DurationPerCell-r16* and is not provided *SlotFormatCombinationsPerCell*, for a set of symbols of a slot that are indicated as downlink or flexible by *tdd-UL-DL-ConfigurationCommon* or *tdd*-*UL-DL-ConfigurationDedicated*, or when *tdd-UL-DL-ConfigurationCommon* and *tdd*-*UL-DL-ConfigurationDedicated* are not provided, the UE cancels the CSI-RS reception in the set of symbols of the slot that are not within the indicated remaining channel occupancy duration. |
| **Q3: Please provide your view on Sharp's proposal/TP.** |
| **Company** | **Comment** |
| Qualcomm | Support |
| LG Electronics | Support |
| Huawei, HiSilicon | Agree  |
| Samsung | Support |
| Sharp | This change is necessary. |
| Nokia, NSB | Support, since we had the same proposal as Sharp  |
| ZTE, Sanechips | Support  |
| Spreadtrum | Support |
| vivo | Support |

## Processing time for switching

ZTE includes the following proposal/TP in R1-2005598:

**Proposal 4: The description for UE processing time of SSS group switching in TS 38.213 should be clarified. The following TP#2 can be considered.**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| -------------------------------- < Start of TP#2 for Clause 10.4 of 38.213 [1]> ----------------------------------10.4 Search space set group switching< Unchanged parts are omitted >A UE can be provided by *searchSpaceSwitchingDelay-r16* a number of symbols $P\_{switch}$. The UE applies the indicated $P\_{switch}$ and does not expect the indicated $P\_{switch}$ to be smaller than a minimum value of $P\_{switch}$. If the UE indicates a corresponding capability, ~~where a~~ the minimum value of $P\_{switch}$ ~~is~~ provided in Table 10.4-1 for ~~UE processing capability 1 and~~ UE processing capability 2 and SCS configuration $μ$ applies. Otherwise, a minimum value of $P\_{switch}$ provided in Table 10.4-1 for UE processing capability 1 and SCS configuration $μ$ applies ~~If the UE indicates a corresponding capability, the UE applies the~~ $P\_{switch}$ ~~value for UE processing capability 2; otherwise, the UE applies the~~ $P\_{switch}$ ~~value for UE processing capability 1 for SCS configuration~~ $μ$. Table 10.4-1: Minimum value of $P\_{switch}$ [symbols]

|  |  |  |
| --- | --- | --- |
| $$μ$$ | Minimum $P\_{switch}$ value for UE processing capability 1 [symbols] | Minimum $P\_{switch}$ value for UE processing capability 2 [symbols] |
| 0 | 25 | 10 |
| 1 | 25 | 12 |
| 2 | 25 | 22 |

< Unchanged parts are omitted >--------------------------------------------- < End of text proposal> ------------------------------------------------ |

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| **Q4: Please provide your view on ZTE's proposal/TP.** |
| **Company** | **Comment** |
| Qualcomm | Agree some clean up of the language is needed. We proposed the following: “A UE can be provided by *searchSpaceSwitchingDelay-r16* a number of symbols 𝑃𝑠𝑤𝑖𝑡𝑐ℎ where a minimum value of 𝑃𝑠𝑤𝑖𝑡𝑐ℎ is provided in Table 10.4-1 for UE processing capability 1 and UE processing capability 2 and SCS configuration 𝜇. UE can indicate if UE processing capability 2 is supported. If UE processing capability 2 is not supported, UE processing capability 1 is supported.” |
| LG Electronics | Support ZTE’s TP. |
| Huawei, HiSilicon | The existing TP is clear. |
| Samsung | Current specification seems clear.  |
| Sharp | Clean-up on this paragraph was made in the last meeting. Not sure if further modification is necessary, as the current description is not incorrect. |
| Nokia, NSB | Same comments as last meeting1. There is no need to clarify that UE shall not indicate value smaller than UE capability. This was also the specification editor’s comment previously.
2. It is important to clarify that capability 1 applies by default if capability 2 is not configured

If CR follows the above principle, we are fine to support. Otherwise not. |
| ZTE, Sanechips | Support our TP, which is to reflect the previous agreement more accurately. |
| Spreadtrum | Current spec seems clear. |
| vivo | Support the TP |