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

Incheon, Korea, May 22 – 26, 2023

Agenda Item: 9.17

Source: Ericsson

Title: Editor’s summary on draft CR 38.211 for NR\_LessThan\_5MHz\_FR1-Core

Document for: Discussion, Decision

# 1 Introduction

This document is intended to facilitate the review process of the draft CR 38.211 for NR\_LessThan\_5MHz\_FR1-Core.

# 2 Discussion – first round

Please provide your comments on **the latest version of the draft CR on 38.211** available in this folder.

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| **Company** | **Comment** |
| **Qualcomm** | 1) Based on the RAN1 agreement ‘In Case of 15 PRBs, the 𝑁RB CORESET = 24 CORESET#0 is punctured’, we slightly prefer ‘puncturing’ than ‘removing’. Also some minor typos are fixed as below:**“**if the CORESET is obtained by applying the description above with interleaved or non-interleaved mapping as defined in clause 13 of [5, TS 38.213], followed by puncturing the 9 resource blocks in each OFDM symbol to obtain the 15 resource blocks forming the CORESET 0.**”**For clarification, we think which ‘9 resource blocks in each OFDM symbol’ are punctured will be further discussed in RAN1, although there is no editor note.2) Since this is already there applied to all CORESET 0, we suggest adding ‘Table 13-0’ for the new CORESET 0 with as below:‘For CORESET 0 configured by the *ControlResourceSetZero* IE:- and are defined by clause 13 of [5, TS 38.213];…For CORESET 0 on a carrier with :- and are defined by Table 13-0 in clause 13 of [5, TS 38.213]’ |
| Huawei, HiSilicon | **//Comment#1**To identify the carrier requiring a new CORESET#0 for 3MHz channel bandwidth, carrier bandwidth is not a feasible condition because is indicated through SIB1 by IE *carrierBandwidth*, which is received after the determination of the CORESET#0. The new sync raster introduced in RAN4 for 3MHz CBW can be used as the condition according to the following RAN4 agreement and RAN plenary LS,* The new sync raster is designed not to overlap with the legacy sync raster by the frequency shift A kHz and the different frequency interval 600kHz. As a result, when the UE perform cell search with the new sync raster and identify a SS/PBCH, the UE has already known the carrier is with 3MHz channel bandwidth.

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| [**R4-2310408**](file:///D%3A%5CRAN4%23107%5CDocs%5CR4-2310408.zip) **WF on system parameters for less than 5MHz channel bandwidth** *Type: other For: Approval Source: Nokia***Decision: Approved.****…****Issue 1-1: The value of A in N \* 600kHz + M \* 50 kHz + A kHz, N ϵ {1:2499}, M ϵ {1,3,5}*** Proposals
	+ Option 1: 300
	+ Option 2: 345
* Agreement
	+ Agree on 300.

**…****Issue 1-3: Finer synchronization raster design for 3 MHz channel bandwidth*** Proposals
	+ Option 1: Use N \* 600 kHz + M \* 50 kHz + A kHz, N ϵ {1:4998}, M ϵ {1,3,5} for 12 PRBs PBCH transmission bandwidth, use N \* 100 kHz + B kHz, N ϵ {9206:1:9232} for 15 PRBs PBCH transmission bandwidth
	+ Option 2: Use N \* 600 kHz + M \* 50 kHz + A kHz
* Agreement
	+ Do not consider Option 1
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| **R1-2302276**:…RAN Plenary has discussed question 1 on legacy bands and UE operation, and concluded the following:* In some bands where the <5MHz feature is planned to be deployed there may be legacy NR UEs, whereas in others there are no legacy NR UEs.
* In order to limit the impact to any legacy UEs in the same frequency range, it would be helpful if the sync raster can be differentiated for the less-than-5MHz channels.
* It is assumed that UE support of the <5MHz feature is band-specific and optional.

… |

**Suggested changes:**For CORESET 0 on a carrier detected in cell search procedure with synchronization raster specific to 3MHz channel bandwidth [14, TS 38.101-1]:- and are defined by clause 13 of [5, TS 38.213]- if the CORESET is obtained by applying the description above assuming interleaved mapping- if the CORESET is obtained by applying the description above with interleaved or non-interleaved mapping as defined in clause 13 of [5, TS 38.213], followed by removing 9 resource blocks in each OFDM symbol to obtain the 15 resource blocks forming the CORESET.…For cell search with synchronization raster specific to 3MHz channel bandwidth [14, TS 38.101-1], the UE is not expected to receive subcarriers 0 to 47 and 192 to 239 in any of the 4 OFDM symbols of the SS/PBCH block.**//Comment#2**Similar to other company comment, “puncturing” is better than “removing” for 15-PRB CORESET#0. |
| ZTE | **Comment#1:** We suggest making it clear that CORESET 0 is configured by the *ControlResourceSetZero* IE as legacy. Regarding it can be changed to ‘minimum channel bandwidth 3 MHz’ similar as the texts in 38.213. ‘For CORESET 0 configured by the *ControlResourceSetZero* IE on a carrier with minimum channel bandwidth 3 MHz:**Comment#2:** In legacy, the interleaving of CORESET 0 is defined in TS 38.211. Similarly, we suggest capturing how to determine interleaved or non-interleaved mapping in TS 38.211. If it is to be captured in 38.213, at least the following revision should be considered for better clarity. - if the CORESET is obtained by applying the description above with interleaved or non-interleaved mapping according to index configured by the *ControlResourceSetZero* IE as defined in clause 13 of [5, TS 38.213], followed by removing 9 resource blocks in each OFDM symbol to obtain the 15 resrouce blocks forming the CORESET.’ |
| Lenovo | Since RAN1 has agreed that “REG bundle size = 6” for 15PRBs CORESET#0, “L=6” can be added as such,For CORESET 0 on a carrier with :- and are defined by clause 13 of [5, TS 38.213]- if the CORESET is obtained by applying the description above assuming interleaved mapping- if the CORESET is obtained by applying the description above with interleaved or non-interleaved mapping as defined in clause 13 of [5, TS 38.213], followed by removing 9 resource blocks in each OFDM symbol to obtain the 15 resrouce blocks forming the CORESET. - L = 6 |
| Nokia, NSB | We tend to agree that for now it is better not to refer to , but instead talk about the channel BW as below. For now, we have not yet agreed that the same CORESET#0 config applies to 5 MHz carriers on a band where 3 MHz is the minimum channel BW, so the wording below seems to reflect the current agreements. If we further agree that Table 13-0 applies also with 5 MHz CBW with less than 24 RB, we can update this (similar case as for 38.213). Below are our recommended edits on top of the version provided by the editor. ----For CORESET 0 on a carrier with a channel BW of 3 MHz ~~:~~- and are defined by clause 13 of [5, TS 38.213]- if the CORESET is obtained by applying the description above assuming interleaved mapping, with R = 2- if the CORESET is obtained by applying the description above with interleaved or non-interleaved mapping as defined in clause 13 of [5, TS 38.213], followed by removing 9 resource blocks in each OFDM symbol to obtain the 15 res~~r~~ource blocks forming the CORESET.- L = 6; |
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Editor’s response:

* Linking the CORESET 0 structure to the search raster was my initial assumption, but I am not sure it properly captures SCells (althgouh this may not be critical). At this stage, the Nokia proposal on writing “a channel bandwidth of 3 MHz” seems appropriate.
* Adding the L and R values as suggested by some companies is fine.
* I agree that puncturing is a better word than removing.

A v2 of the CR is available in this folder.

# 2 Discussion – second round

Please provide your comments on **the latest version of the draft CR on 38.211** available in this folder.

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| **Company** | **Comment** |
| Samsung | We agree that without mentioning “sync raster” is a better formulation, since not every SSB has to be located on sync raster (e.g., SCell) even with associated CPRESET#0 (e.g. for ANR purpose). Generally saying “3 MHz channel bandwidth” is technically more solid and aligned with the agreements. Just one minor comment on the wording. “For CORESET 0 on a carrier with a channel bandwidth of 3 MHz configured by the *ControlResourceSetZero* IE” could give an impression that the channel bandwidth is configured by *ControlResourceSetZero* IE, which is obviously not the intention. So may be adding an “and” can clarify the intention. For example, the following wording is suggested: For CORESET 0 on a carrier with a channel bandwidth of 3 MHz configured and by the *ControlResourceSetZero* IE. |
| Ericsson | In clause 7.3.2.2, we have the following suggestion as to align the description of the bullets:

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| For CORESET 0 on a carrier with a channel bandwidth of 3 MHz configured by the *ControlResourceSetZero* IE:- and are defined by Table 13-0 in clause 13 of [5, TS 38.213]- if the CORESET is obtained by applying the description above assuming interleaved mapping with - if the CORESET is obtained by applying the description above with interleaved mapping with or non-interleaved mapping as defined in clause 13 of [5, TS 38.213], followed by puncturing 9 resource blocks in each OFDM symbol to obtain the 15 resource blocks forming CORESET 0. -  |

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| **Qualcomm** | On top of Ericsson’s revision, we suggest adding more bullets as below, similar as legacy CORESET0. The [within a REG bundle] in last bullet is to be discussed in next RAN1 meeting, since it will impact the UE behavior for PDCCH detection.For CORESET 0 on a carrier with a channel bandwidth of 3 MHz configured by the *ControlResourceSetZero* IE:- and are defined by Table 13-0 in clause 13 of [5, TS 38.213]- if the CORESET is obtained by applying the description above assuming interleaved mapping with - if the CORESET is obtained by applying the description above with interleaved mapping with or non-interleaved mapping as defined in clause 13 of [5, TS 38.213], followed by puncturing 9 resource blocks in each OFDM symbol to obtain the 15 resource blocks forming CORESET 0. - - - the UE may assume normal cyclic prefix when CORESET 0 is configured by MIB or SIB1;- the UE may assume the same precoding being used [within a REG bundle]. |
| Huawei, HiSilicon | Thank you for your responses. **//Comment#1**The only concern for “sync raster” seems SCell of CA. Please note that CA has been precluded in the same RAN plenary LS R1-2302276 as cited before. Therefore, considering the only feasible way, it seems safe to add sync raster to make the spec clearer. At least keep sync raster in brackets as a discussion point for companies to check and provide feedbacks.

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| **R1-2302276**:…RAN Plenary has discussed question 1 on legacy bands and UE operation, and concluded the following:* In some bands where the <5MHz feature is planned to be deployed there may be legacy NR UEs, whereas in others there are no legacy NR UEs.
* In order to limit the impact to any legacy UEs in the same frequency range, it would be helpful if the sync raster can be differentiated for the less-than-5MHz channels.
* It is assumed that UE support of the <5MHz feature is band-specific and optional.

RAN Plenary has discussed question 2 on the feature list to be considered, and concluded that the less-than-5MHz WI in Rel-18 should consider single-carrier operation, excluding RedCap. In addition, UE speeds up to 500km/h should be targeted for Band n100 without impact to RAN1. |

**Suggested changes:**For CORESET 0 on a carrier with synchronization raster specific to ~~a~~ channel bandwidth of 3 MHz ~~configured by the~~ *~~ControlResourceSetZero~~* ~~IE~~:….For cell search on a carrier with synchronization raster specific to ~~a~~ channel bandwidth of 3 MHz, …//**Comment#2**Support the last two bullets suggested from QC, i.e.Adding:- the UE may assume normal cyclic prefix when CORESET 0 is configured by MIB or SIB1;- the UE may assume the same precoding being used [within a REG bundle]. |
| Ericsson v11 | About the proposal of adding “the UE may assume the same precoding being used [within a REG bundle],” in our understanding "REG bundle size = 6" is as per legacy which is reflected in the draft CR as "L =6", therefore the statement "the UE may assume the same precoding being used [within a REG bundle]" touches upon an optimization. In our understanding we won't pursue any optimization, we will just finalize what was strictly pending to be done e.g., the support of the sub-5MHz use-case. |
| Lenovo | Support to add these two bullets proposed by QC, - the UE may assume normal cyclic prefix when CORESET 0 is configured by MIB or SIB1;- the UE may assume the same precoding being used [within a REG bundle].For this below bullet, we may check if it could be agreed in the next meeting. From the discussion in previous RAN1 meeting, there was some concern that n\_shift = cell ID may lead to different PDCCH detection performance in different cells. -  |