3GPP TSG-RAN WG2 #121bis electronic R2-20xxxxx

17- 26 April 2023

Agenda Item: 5.1.3.2

Source: ZTE, Sanechips

Title: Summary of offline [AT121bis-e][004][NR1516] UE cap (ZTE)

Document for: Discussion, Decision

# 1 Introduction

This contribution summarizes the following discussion:

* [AT121bis-e][004][NR1516] UE cap (ZTE)

 Scope: Treat R2-2302437 (if needed), R2-2303660, R2-2303877, R2-2303878, R2-2303879, R2-2303880, R2-2303881, R2-2304161, R2-2304162, R2-2304163, R2-2304164, R2-2304165, R2-2304166
Ph1: Determine agreeable parts. Ph2: For agreeable parts, if any, reflect these in agreeable CRs.

 Intended outcome: Report, If applicable: In-Principle-Agreed CRs

 Deadline: Schedule 1

**Contact from companies**

|  |  |
| --- | --- |
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# Discussion

## 2.1 Part 1: Intended to determine agreeable parts

Part 1 discussion is focusing on reaching conclusion whether the proposals/CRs can be agreed in principle, and Part 2 discussion would then focus on detailed changes for those agreeable contributions.

### LS on the SRS antenna Switching

[R2-2302437](file:///C%3A%5C%5CUsers%5C%5Cmtk65284%5C%5CDocuments%5C%5C3GPP%5C%5Ctsg_ran%5C%5CWG2_RL2%5C%5CTSGR2_121bis-e%5C%5CDocs%5C%5CR2-2302437.zip%22%20%5Co%20%22C%3AUsersmtk65284Documents3GPPtsg_ranWG2_RL2TSGR2_121bis-eDocsR2-2302437.zip) LS on clarification on impact of SRS antenna switching for TDD-FDD band combinations (R4-2303633; contact: Huawei) RAN4 LS in Rel-15 NR\_newRAT-Core To:RAN1 Cc:RAN2

RAN2 is CCed. Proposed Noted

For this LS, the Chairman proposed to be noted immediately for that RAN2 is CCed.

**Q1: Do companies agree with the chair’s proposal to Note this LS immediately?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes or No** | **Comments** |
| Ericsson | Yes |  |
| ZTE | Yes |  |
| Huawei, HiSilicon | Yes |  |
| Xiaomi  | Yes  |  |
| OPPO | Yes |  |
| Apple  | Yes |  |
| Nokia, Nokia Shanghai Bell | Yes |  |
| Qualcomm Incorporated | Yes |  |
| Intel | Yes |  |
| MediaTek | Yes |  |
| Samsung | Yes |  |
| vivo | Yes |  |

Summary:

All companies agree that the [R2-2302437](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2302437.zip) can be noted immediately

**Proposal 1:** [**R2-2302437**](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2302437.zip) **is proposed to be noted immediately.**

### SRS Tx Switching Capability

[R2-2303660](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2303660.zip) Handling of SRS Tx switching capability Ericsson discussion

|  |
| --- |
| [Proposal 1 RAN2 to confirm the following behaviour for the parameters *txSwitchImpactToRx* and *txSwitchWithAnotherBand* in *srs-TxSwitch*:](#_Toc131702722)[Bands with UL that impact each other define a group (i.e. SRS TX switching on any of the cells will impact UL on all the cells in the group). All the band entries in the group will signal the same group identifier in *txSwitchWithAnotherBand*. The first-listed band entry number in the group shall be used as identifier for the group. An UL group with only one band entry is not signaled in *txSwitchWithAnotherBand*.](#_Toc131702723)[For bands where the DL is impacted by an UL group with a single band entry, *txSwitchImpactToRx* shall indicate the band entry number of that UL band. For bands where the DL is impacted by an UL group with more than one band entry, *txSwitchImpactToRx* shall point to the UL group using the group identifier number (as defined by *txSwitchWithAnotherBand*).](#_Toc131702724)[Proposal 2 The behaviour of *txSwitchImpactToRx* and *txSwitchWithAnotherBand* should be clarified in 38.306.](#_Toc131702725) |

**Q2: Do companies agree with the proposal 1 in the** [R2-2303660](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2303660.zip)**?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes or No** | **Comments** |
| Ericsson | Yes | Proponent |
| ZTE | Yes | We agree with the clarification |
| Huawei, HiSilicon | Yes with comments | For the txSwitchImpactToRx, we would like to further confirm the understanding is the impact to DL band is brought by the srs tx switching behavior of the UL band with srs-TxSwitch capability, because the txSwitchImpactToRx may point to a first-listed UL band without srs tx switching capability. [Ericsson] Yes the impact is related to the SRS Tx switching behavior of the UL band with srs-TxSwitch capability, but the actual signaling would depend on impacted bands, UL support for the bands, and the order of band entries in the BC, hence txSwitchImpactToRx may point to a first-listed UL band without srs tx switching capability, as in example 4 from the paper. |
| Xiaomi  | Yes  |  |
| OPPO | Yes in general | Some question on the examples:#4 example, I understand the txSwitchImpactToRx is set as “-” under band B is because band A doesn’t support SRS switch, then why should txSwitchWithAnotherBand of band B is “1” ? for #5 there is similar issue.[Ericsson] It could be that band A would support SRS switch, but as long as there is no impact to the DL of band B for this example, then txSwitchImpactToRx should not be included (i.e. represented as “-” in the example tables). We understand that, unless the UL group contains only a single band entry, the *txSwitchWithAnotherBand* for the band supporting the feature should always be set to identify the group. #6 example, the table implies band B and band C is a group. But what if band B and band C don’t impact each other while they can impact A?[Ericsson] The current signaling does not have the granularity to indicate those details, since each field can only indicate a single value and thus be part of one group. We understand the signaling is a compromise between complexity and flexibility. |
| Nokia, Nokia Shanghai Bell | Yes | We agree with the intent and are fine by confirming the correct UE behavior. However, it was not clear what the exact ambiguity currently is – could that be clarified? [Ericsson] We think currently it is not clear in 38.306 how this grouping is defined since the specifications do not distinguish between the UE setting of the fields in case there is a single UL in the group or in case there is more than one UL in the group. Also 38.306 does not mention how to handle txSwitchImpactToRx/txSwitchWithAnotherBand in case the feature is not supported (as stated in our proposal, we understand that the UE shall set txSwitchWithAnotherBand to the first-listed band with UL in the group, regardless if the UE supports the feature on that band or not). Some examples of cases we have seen are:* Setting txSwitchImpactToRx and txSwitchWithAnotherBand, in the band entry supporting srs-TxSwitch, to the impacted bands, i.e. that would imply that txSwitchImpactToRx and txSwitchWithAnotherBand point to the band that is affected by this UL (not to the one that affects them); that would also imply that no grouping can be defined since each entry supporting srs-TxSwitch could indicate only one affected UL/DL pair.
* Setting txSwitchImpactToRx and txSwitchWithAnotherBand, in the band supporting srs-TxSwitch, to 1, regardless of the entry number of the band supporting srs-TxSwitch, and regardless of whether the first listed band in the band combination supports UL or not.

Hence, given the examples above, we think it should be clarified on how to set the fields txSwitchImpactToRx and txSwitchWithAnotherBand. We think also that generally, having two different wordings for UL and DL probably causes confusion as well i.e. “that affects this DL” and “that switches together with this UL”, it may be easier to refer to grouping directly rather than the current definition. |
| Qualcomm Incorporated | Yes | We tend to agree with Nokia. Could the proponent clarify where the ambiguity resides and how the UE implementations in the field are different?[Ericsson] We added further comments above. |
| Intel | Yes | Agree with the understanding.  |
| MediaTek | Yes with comments | In our understanding, for the *txSwitchImpactToRx*, the UE needs to indicate the entry number of aggressor band. However, the case when the aggressor band belongs to a certain “switch group” is not clearly specified.[Ericsson] We agree this would be the case when the UL group is composed of a single band entry. We think the proponent’s understanding is like how the UE reports SRS Tx switching capabilities in LTE and we support such clarification if it is majority consensus. |
| Samsung | Yes with questions | We have similar understanding with the proposal. On the other hand, we would like to further clarify, e.g.As UL Band 1 impacts UL Band 2 (i.e. one-way), do the bands belongs to a group?[Ericsson] Yes, that implies that the signaling is not flexible enough to indicate only one-way impact, which would require a much larger table from each band to all other bands. We understand the current signaling is a compromise between complexity and flexibility.Can DL be impacted by multiple UL band groups? If so, what shall *txSwitchImpactToRx* point to?[Ericsson] In our understanding, it shall point to the UL group using the UL group identifier number, such number would then be defined according to the aspects to take into consideration for the UL group identifier as in the first half of proposal one, i.e. *“Bands with UL that impact each other define a group (i.e. SRS TX switching on any of the cells will impact UL on all the cells in the group). All the band entries in the group will signal the same group identifier in txSwitchWithAnotherBand. The first-listed band entry number in the group shall be used as identifier for the group. An UL group with only one band entry is not signaled in txSwitchWithAnotherBand.”* |
| vivo | Yes |  |

**Q3: Do companies agree with the proposal 2 in the** [R2-2303660](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2303660.zip)**?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes or No** | **Comments** |
| Ericsson | Yes | Proponent |
| ZTE | No | We think it can be clarified in the chairman note without spec change. |
| Huawei, HiSlicon | No | We think some clarification in the chairman note is enough because we see the proposal2 is aligned with the field description in current 38.306. No additional spec change is needed. |
| Xiaomi  | Yes  | No strong view. |
| OPPO | comment | We are fine to clarify. For example for following sentence:*All DL and UL that switch together indicate the same entry number.*I assume DL is just impacted but will not switch together, right? |
| Nokia, Nokia Shanghai Bell | Yes but | If there is ambiguity, we support clarifying that. But we need to better understand the interpretation ambiguity before agreeing to any wording changes. |
| Qualcomm Incorporated | Yes | We tend to agree with Nokia. Could the proponent clarify where the ambiguity resides and how the UE implementations in the field are different? |
| Intel | See comments | We are not sure what other interpretations based on the current definition, Maybe, it will be good to show what ambiguity on the current definition.  |
| MediaTek | Yes | We support because:1. We think following requirements are not specified (at least not clearly captured) in current 38.306 and they could be the source of UE behaviour ambiguity:
	1. **An UL group with only one band entry is not signaled in *txSwitchWithAnotherBand***
	2. **For bands where the DL is impacted by an UL group with more than one band entry, *txSwitchImpactToRx* shall point to the UL group using the group identifier number (as defined by *txSwitchWithAnotherBand*)**
2. We have an observation in the Example #6:

There would be an additional restriction when scheduling UL of B and C but there is no such UE capability assumption, although the SRS Tx switching functionality still works. We see this a limitation of current SRS Tx switching capability signalling based on proponent’s proposal. We hope we’re wrong on this and would like to see if any clarification. |
| Samsung | Maybe yes | We have not assumed that the current capability description is perfect. At least, a clarification is required in the chair note. |
| vivo | Yes | We think there is no harm to clarify it about the correct understanding. By chairman notes can also be acceptable to us if it is the majority view. |

For the Q2/Q3, all companies generally agree with the proposal 1 in the [R2-2303660](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2303660.zip), some questions are also proposed for the better understanding of the proposal 1 and the proponent provided more detail explanations. Until now it’s not quite clear on whether the spec change is needed, thus as the rapporteur, it’s suggest to confirm the understanding as in the proposal 1 of [R2-2303660](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2303660.zip) first, then we can discuss whether (and how) the spec change is needed in the next meeting.

**Proposal 2 RAN2 confirm the following behaviour for the parameters txSwitchImpactToRx and txSwitchWithAnotherBand in srs-TxSwitch:**

* **Bands with UL that impact each other define a group (i.e. SRS TX switching on any of the cells will impact UL on all the cells in the group). All the band entries in the group will signal the same group identifier in txSwitchWithAnotherBand. The first-listed band entry number in the group shall be used as identifier for the group. An UL group with only one band entry is not signaled in txSwitchWithAnotherBand.**
* **For bands where the DL is impacted by an UL group with a single band entry, txSwitchImpactToRx shall indicate the band entry number of that UL band. For bands where the DL is impacted by an UL group with more than one band entry, txSwitchImpactToRx shall point to the UL group using the group identifier number (as defined by txSwitchWithAnotherBand).**

**Proposal 3: RAN2 to discuss whether (and how) the spec change is needed in the next meeting.**

### Miscellaneous Correction on UE capability

[R2-2303877](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2303877.zip) Miscellaneous Correction on UE capability-R15 ZTE Corporation, Sanechips CR Rel-15 38.306 15.20.0 0895 - F NR\_newRAT-Core

[R2-2303878](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2303878.zip) Miscellaneous Correction on UE capability-R16 ZTE Corporation, Sanechips CR Rel-16 38.306 16.12.0 0896 - A NR\_newRAT-Core

[R2-2303879](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2303879.zip) Miscellaneous Correction on UE capability-R17 ZTE Corporation, Sanechips CR Rel-17 38.306 17.4.0 0897 - A NR\_newRAT-Core

Two changes are included in the CRs, one is about the PUSCH MIMO transmission, and the other one is about the PDSCH RE resource mapping.

**Q4: Do companies agree with the first change in the** [R2-2303877](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2303877.zip)/R2-2303878/R2-2303879?

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes or No** | **Comments** |
| Ericsson | Yes | We are fine with the change – we understand both changes are editorial. |
| ZTE | Yes | ProponentFor the non-CB based parameters, we agree that it’s editorial, but for the CB-based parameters it’s F class correction, for that it’s not correct to describe the prerequisite ( *pusch-TransCoherence)* only for the first sub-element (maxNumberMIMO-LayersCB-PUSCH MIMO-LayersUL).  |
| Huawei, HiSilicon | Yes |  |
| Xiaomi  | Yes  |  |
| CATT | Yes |  |
| OPPO | Yes but | We are fine with 1st changeFor non-CB parameters, *mimo-NonCB-PUSCH* covering *maxNumberSRS-ResourcePerSet and maxNumberSimultaneousSRS-ResourceTx* are referred in other two places. So I wondering whether we should put these two under *mimo-NonCB-PUSCH*, which is similar to the 1st change. Otherwise people have to go back to 38822 to find the reference which is not so nice.[ZTE]Thanks for the comments, we’ll modify it in the phase 2 |
| Nokia, Nokia Shanghai Bell | Yes | This change is OK. Parameters are indeed missing in 38.306.  |
| Qualcomm Incorporated | Yes, but | Why don't we also create a parameter group for "mimo-NonCB-PUSCH" if we will do it for "mimo-CB-PUSCH"?[ZTE]OK, let’s also include it in the phase 2 (we didn’t include this modification just because in the spec it requires the UE to report 3 capabilities for the NonCB together) |
| Intel | See comments | 1st change is not essential since nothing is broken.  It is just reformatting the field description. However, we can also go with the majority    |
| MediaTek | No | It is quite a change for Rel-15. We also have concerns on the same point mentioned by QC:Based on the same reason in the coversheet, the IE *mimo-NonCB-PUSCH* is also missed in TS 38.306, but proponent didn't capture the TP by the same way as they did for *mimo-CB-PUSCH*. We suppose it is due to the current ASN.1 structure but we prefer to see a unified way (and aligned with current ASN.1 structure) to organize the FD of TS 38.306 to avoid unintentional functional change.[ZTE] We will solve this concern in the Phase 2 version. |
| Samsung | Yes |  |
| Apple | No | For mimo-CB-PUSCH introduction and IE restructuring, this seems to be an editorial enhancement. For the NonCB-PUSCH related IEs, it is also editorial, however, these 3 IEs are not defined together in the ASN.1. Also, there is no UE capability of mimo-NonCB-PUSCH in 38.300 even though “mimo-NonCB-PUSCH” is referenced in a few places. These places would have to be replaced with maxNumberSimultaneousSRS-ResourceTx/maxNumberSRS-ResourcePerSet now – or mimo-NonCB-PUSCH needs to be defined – which seems cleaner, but we also prefer to see a unified way with current ASN.1 structure.On the mimo-CB-PUSCH introduction, the CR cover page should make it clear that "maxNumberMIMO-LayersCB-PUSCH” already exists and is being folded into this. We also share the view with OPPO, Qualcomm and MediaTek. |
| vivo | Yes |  |

**Q5: Do companies agree with the second change in the** [R2-2303877](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2303877.zip)/R2-2303878/R2-2303879?

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes or No** | **Comments** |
| Ericsson | Yes | We are fine with the change – we understand both changes are editorial. |
| ZTE | Yes | ProponentAccording to RAN1 Feature 2-33a, the “bitmap” for the *“pdsch-RE-MappingFR1-PerSymbol/pdsch-RE-MappingFR1-PerSlot”* are different, * For the *pdsch-RE-MappingFR1-PerSymbol,* it means the resources defined in the bitmap of the *rateMatchingResrcSetSemi-Static* and the *rateMatchingResrcSetDynamic* (5-26/27),
* For the *pdsch-RE-MappingFR1-PerSlot,* it means the resources defined in the bitmap of the *rateMatchingResrcSetSemi-Static, rateMatchingResrcSetDynamic* and the *rateMatchingCtrlResrcSetDynamic*(5-26/27/27a).

Same issue also exists for the “*pdsch-RE-MappingFR2-PerSymbol/pdsch-RE-MappingFR2-PerSlot”*In the current spec, it’s unclear what does the bitmap mean, and it’s also unclear on whether the same/different resources are defined for the p*dsch-RE-MappingFR1-PerSymbol and pdsch-RE-MappingFR1-PerSlot* |
| Huawei, HiSilicon | Yes | We agree with the intention, but we think there will be no issue in real network to use the bitmap.  |
| Xiaomi  | Yes  |  |
| CATT | Yes |  |
| OPPO | Yes | We are fine with the intention |
| Nokia, Nokia Shanghai Bell | Yes | We are fine with the change.  |
| Qualcomm Incorporated | Yes | The proposed text is a bit lengthy and may be difficult to understand though…. |
| Intel | See comments | 2nd change is again not essential since nothing is broken (it just further describes the resource or bitmap which is already in RAN1 spec). However, we can also go with the majority     |
| MediaTek | See comments | The further clarification in the 2nd part seems okay but we also think it is not essential (not necessarily to be introduced from Rel-15).NOTE: There're some errors in the coversheet like meeting date or WI code[ZTE]Thanks for pointing out this error, we will modify it in phase 2. |
| Samsung | Yes |  |
| Apple | No | Regarding the PDSCH PerSymbol/PerSlot mapping patterns, we don’t think the proposed CR is helpful. * The resources are already clearly mentioned in 38.306.
* The UE capabilities rateMatchingResrcSetSemi-Static, rateMatchingResrcSetDynamic, and rateMatchingCtrlResrcSetDynamic covers the following
	+ rateMatchingResrcSetSemi-Static: RRC configured RB level bitmap and ControlResourceSet;
	+ rateMatchingResrcSetDynamic: RRC configured and DCI signaled RB level bitmap
	+ rateMatchingCtrlResrcSetDynamic: RRC configured and DCI signaled ControlResourceSet
* Based on this understanding, we see 2 problems with the proposed CR:
	+ 1. The CR indicates that these UE capabilities are only for bitmap

[ZTE]We don't intends to clarify that "only for the bitmap", our intention is to clarify that the bitmap have the different meaning for the per slot and per symbol level (e.g. 2-57a). * + 2. Not clear why the CR indicates that rateMatchingCtrlResrcSetDynamic is only applicable to PerSlot UE capability.

[ZTE] This is indicated in the RAN1 feature list, we just try to keep aligned with RAN1 decision. From technical aspect, our understanding is that it's more difficult (compared with per slot level) for the UE to support per symbol level Dynamic rate-matching control resource set (2-57a) |
| vivo | Yes |  |

Summary:

For the Q4, 10 companies say Yes to the first change, the other companies think it’s editorial change. For the Q5, 10 companies say Yes to the first change, 2 companies think its editorial and give some wording modification suggestion, 1 company give 2 detail problems and the proponent company provided the reply (which can also be further confirmed in the phase 2 discussion). To follow the majorities, suggest to agree with the change and update the CR wording in phase 2 based on the comments.

**Proposal 4: Pursue the CRs** [**R2-2303877**](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2303877.zip)**/R2-2303878/R2-2303879, and update the CRs wording in phase 2 based on the comments.**

### PDCCH Blind Detection

[R2-2303880](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2303880.zip) Correction on PDCCH Blind Detection-R16 ZTE Corporation, Sanechips CR Rel-16 38.306 16.12.0 0898 - F NR\_L1enh\_URLLC

[R2-2303881](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2303881.zip) Correction on PDCCH Blind Detection-R17 ZTE Corporation, Sanechips CR Rel-17 38.306 17.4.0 0899 - A NR\_L1enh\_URLLC

**Q6: Do companies agree with the change in the** R2-2303880/R2-2303881?

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes or No** | **Comments** |
| Ericsson | Yes | We are fine with the change, we understand this change is also editorial. |
| ZTE | Yes | We think it’s F class correction, for that it will give restriction to the corresponding capabilities:1. g.

If the UE reports pdcch-BlindDetectionCA-r16,- Candidate values for pdcch-BlindDetectionMCG-UE-r16 is 1 to pdcch-BlindDetectionCA-r16-1- Candidate values for pdcch-BlindDetectionSCG-UE-r16 is 1 to pdcch-BlindDetectionCA-r16-1- - pdcch-BlindDetectionMCG-UE-r16 + pdcch-BlindDetectionSCG-UE-r16 >= pdcch-BlindDetectionCA-r16.....Further more, it also restricts to the NR-DC only.We use the short wording “ as specified in clause 10 in TS 38.213 [11] for the NR-DC.” just for the simplicity. |
| Huawei, HiSilicon | No | We think it is clear enough in RAN1 spec, there will be no misunderstanding. The change is not essential to RAN2 spec. |
| Xiaomi  | Yes  |  |
| CATT | Yes | Fine to add the clarification to make the spec clearer.  |
| OPPO | Yes | Fine to clarify.  |
| Apple | No strong view | TS 38.213 clause 10 is already referenced in the second part of the existing capability description. If the CR is deemed necessary, then at least the title of the Rel-17 CR needs to be corrected from -r17 to -r16 as FG 11-2d is for Rel-16 only (assuming R2-2303881 is just the shadow CR of R2-2303880). Arguably the presence of MCG & SCG in the description would imply that the capabilities are for NR-DC (and therefore maybe it’s not essential), but the additional clarity does not hurt. |
| Nokia, Nokia Shanghai Bell | Yes | Fine to add reference to 38.213 (it was indeed missing from 38.306).  |
| Qualcomm Incorporated | Yes |  |
| Intel | Yes | It is fine to add a reference to RAN1 spec for those restriction in the feature list.  |
| MediaTek | See comments | Clarification is fine but it seems not essential. |
| Samsung | Maybe no | It need not be repeated also in RAN2 specification. |
| vivo | Yes |  |

Summary:

9 companies say Yes to this CR, the other companies don’t think it’s essential. To follow the majorities, suggest to agree these 2 CRs.

**Proposal 5: Agree the CRs R2-2303880/R2-2303881.**

### Pusch Repetition TypeB

[R2-2304163](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2304163.zip) Correction on pusch-RepetitionTypeB capability Huawei, HiSilicon CR Rel-16 38.331 16.12.0 4059 - F NR\_L1enh\_URLLC-Core

[R2-2304164](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2304164.zip) Correction on pusch-RepetitionTypeB capability Huawei, HiSilicon CR Rel-17 38.331 17.4.0 4060 - A NR\_L1enh\_URLLC-Core

**Q7: Do companies agree with the change in the** R2-2304163/R2-2304164?

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes or No** | **Comments** |
| Ericsson | ~~No~~ Fine with the intention, backwards compatibility can be further discussed | The CR coversheet states the following:In 38.822, the pusch-RepetitionTypeB-r16 capability indicates the supported maximum number of PUSCH transmissions within a slot for all TB(s), with the candidate value of {2, 3, 4, 7, 8, 12}. Besides, the supported value should be separately reported for UE processing capability 1 and for UE processing capability 2 if the UE supports both processing capabilities. The processing capability 1 is mandatory supported without signalling, and the processing capability 2 is defined by pusch-ProcessingType2.There seems to be some contradiction between the two highlighted sentences – if UE processing capability 1 is mandatory supported without signaling then there would be nothing to signal for UE processing capability 1 and only signaling for processing capability 2 is required, so some clarification seems needed. Also if the yellow highlighted sentence above holds, then introduction of any new value for UE processing capability 1 lower than the one expected without capability signaling would be non-backwards compatible.After further explanation from proponent, we are fine with the intention. We think how to ensure backwards compatibility can be further discussed. |
| Huawei, HiSilicon | Yes(proponent) | As for the comments from Ericsson, it should be noticed that the pusch-repetitionTypeB is a different capability with pusch processing capability. Pusch processing cap1 is by default supported by RAN1 FG 5-1, and more values are optionally supported by pusch-ProcessingType1-DifferentTB-PerSlot. Pusch processing cap2 is optionally supported by pusch-ProcessingType2. According to 38.822 FG11-5, the component for pusch-repetitionTypeB should be separately reported for processing cap1 and cap2 if the UE supports both. However, there is only one value defined in current spec.To ensure backward compatibility, we understand the legacy value is applicable for processing cap 1 if processing cap 2 is not supported, or the legacy value is applicable for both cap1 and cap2 if cap2 is supported by the UE, in this case, the legacy value should be a lower one taking both cap1 and cap2 into account. |
| Xiaomi  | No strong view | Whether the LS to RAN1 is needed? |
| CATT | Yes |  |
| OPPO | Yes |  |
| Apple | Yes |  |
| Nokia, Nokia Shanghai Bell | Yes but(Intent: Yes Change: No) | We agree with the intention of this change. However, when it comes to the implementation of this change, for backward compatibility, we propose to reuse the existing signaling for UE processing capability 1 and only define a new signaling for UE processing capability 2 which is only reported in case different values are supported for different processing capabilities.  |
| Qualcomm Incorporated | Yes | We understand the essence of the proposal is.* It addresses the possible legacy UE implementation supporting both processing capability 1 and 2 with the common a common UE capability for the maximum number of PUSCH transmissions.
* It allows new UE implementation to indicate different capabilities for processing capability 1 and 2.
* The network must implement the new UE capability field if it supports processing capability 2.
 |
| Intel | Yes, but | Agree with the intention since this is aligned with the Rel-16 RAN1 feature list of Component 7: *Supported maximum number of PUSCH transmissions within a slot for all TB(s), where each actual repetition for PUSCH repetition type B is counted as 1 PUSCH transmission, separately reported for UE processing capability 1 and for UE processing capability 2 if UE supports both processing capabilities.* The ASN.1 change is not backward compatible since Rel-17 IEs have already been added.  Need to use critical extension.   |
| MediaTek | Yes | These CRs allow the UEs to differentiate maximum number of PUSCH transmissions within a slot and reported for UE processing capability 1 and 2 separately. |
| Samsung | Yes | There is misalignment between 38.822 and 38.331.  |
| vivo | Yes |  |

[R2-2304161](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2304161.zip) Correction on pusch-RepetitionTypeB capability Huawei, HiSilicon CR Rel-16 38.306 16.12.0 0901 - F NR\_L1enh\_URLLC-Core

[R2-2304162](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2304162.zip) Correction on pusch-RepetitionTypeB capability Huawei, HiSilicon CR Rel-17 38.306 17.4.0 0902 - A NR\_L1enh\_URLLC-Core

**Q7: Do companies agree with the change in the** R2-2304161/R2-2304162?

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes or No** | **Comments** |
| Ericsson |  | Similar comments as for Q6. |
| Huawei, HiSilicon | Yes(proponent) |  |
| Xiaomi  | No strong view | Whether the LS to RAN1 is needed? |
| CATT | Yes |  |
| OPPO | Yes |  |
| Apple | Yes |  |
| Nokia, Nokia Shanghai Bell | Yes but | See comment in Q6. |
| Qualcomm Incorporated | Yes |  |
| Intel | Yes |  |
| MediaTek | Yes | The feature (PUSCH repetition type B) is beneficial for achieving low latency and is relevant to CG. It is fine to fully implement capability signalling according to RAN1 requirement. |
| Samsung | Yes |  |
| vivo | Yes |  |

For the Q6 and Q7, based on the companies inputs, most companies agree with the intention, but companies also point out that there is NBC issue within the current Asn.1coding ([R2-2304163](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2304163.zip)/[R2-2304164](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2304163.zip)) which shall be solved further. The proponent companies can try to modify the CR to solve the NBC issues in the Phase2.

**Proposal 6: Agree with the intention of R2-2304161/R2-2304162/R2-2304163/R2-2304164/, update the CRs in the Phase 2 based on the companies’ comments (e.g. ASN.1 coding issue).**

### NR-DC Capability

[R2-2304165](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2304165.zip) Corrections on NR-DC capabilities Huawei, HiSilicon CR Rel-16 38.306 16.12.0 0903 - F LTE\_NR\_DC\_CA\_enh-Core

[R2-2304166](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2304166.zip) Corrections on NR-DC capabilities Huawei, HiSilicon CR Rel-17 38.306 17.4.0 0904 - A LTE\_NR\_DC\_CA\_enh-Core

Two modifications were made for the *ca-parametersNRDC* and *asyncNRDC-r16* respectively in the CR.

**Q8: Do companies agree with the first change in the** [R2-2304165](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2303877.zip)/R2-2304166?

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes or No** | **Comments** |
| Ericsson | ~~No~~ (First clarify companies understanding on what should be the allowed behaviour) | We think the change is non backwards compatible since a current NW would expect the UE to support FR1-FR2 NR-DC as specified in 38.306.After checking the comments below, it seems companies think support of only FR1 NR-DC is already allowed by current specifications. We think that the current wording in 38.306 does not make any exception and just states that the UE shall support the FR1-FR2 NR-DC configuration. Within that said, if companies think that UE support of only FR1 NR-DC should be allowed in the specification, then we think this should be reflected clearly in 38.306 (e.g. the change proposed by HW would be good). |
| ZTE | No? | We failed to understand the meaning of the CR. The two capabilities are defined as per-BC level, so it is obvious that the following statement applies only when the associated BC includes both FR1 and FR2 bands. “A UE indicating support for NR-DC shall support synchronous NR-DC configuration where all serving cells of the MCG are in FR1 and all serving cells of the SCG are in FR2.” |
| Huawei, HiSilicon | Yes(proponent) | We think the NR-DC band combination defined in RAN4 is release independent, and the UE is allowed to support intra-FR NR-DC combinations only. For an intra-FR NR-DC combination, the ca-ParametersNRDC should also be signaled by the UE.There will be no inter-operability issue with legacy NW because when only intra-FR NR-DC combination is supported, the band combination will only include intra-FR bands. There will be no misunderstanding from the legacy NW. We understand the prerequisite is to ensure the backward compatibility with legacy NW only when the band combination includes both FR1 and FR2 bands.As for the comment from ZTE, we think we share the same understanding on the capability itself. But we should make it clear in the spec as the current text brings much ambiguity according to the comments from companies so far.  |
| Xiaomi  | Yes  |  |
| CATT |  | We are fine to add the clarification to make the spec clearer, even we do not think this will cause real problem.  |
| OPPO | No | The similar view as ZTE, the capability description is clear enough. |
| Apple | No | We do not think this is necessary. |
| Nokia, Nokia Shanghai Bell  | No  | We don’t see the need of this change even though we agree the capability is intended for FR1+FR2 DC as the specification already states (see yellow highlighted part): “A UE indicating support for NR-DC shall support synchronous NR-DC configuration where all serving cells of the MCG are in FR1 and all serving cells of the SCG are in FR2.”So why is this part not sufficient?Furthermore, we don’t understand the justification given as a reason for change i.e., “Otherwise, this will lead to an over limitation that intra-FR only NR-DC combination can not be supported by the UE if *ca-parametersNRDC* is not included.” – could the proponents clarify what is the limitation this could lead to?*[Huawei, HiSilicon]:* For the yellow highlighted part, there are two interpretations:1) for the NR-DC where all serving cells of the MCG are in FR1 and all serving cells of the SCG are in FR2, the UE shall support synchronous NR-DC configuration;2) UE indicating support for NR-DC shall support synchronous NR-DC configuration with all serving cells of the MCG in FR1 and all serving cells of the SCG in FR2.Since mixed FR1/FR2 NR-DC is introduced in Rel-16(e.g. FR1 MCG, FR1+FR2 SCG), to ensure backward compatibility with legacy Rel-15 NW (i.e. only FR1+FR2 NR-DC is supported), the prerequisite is added. Thus, we think the interpretation 2 is the original intention. That means the yellow highlighted part is a requirement on the supported NR-DC type. However, as commented by Intel, the current spec implies that a UE supporting NR-DC shall also support FR1+FR2 NR-DC. In other words, **the ca-parametersNRDC can only be signaled when the UE supports FR1+FR2 NR-DC**. That’s why we say the current spec has a limitation to the UE, and a change is needed to clarify the prerequisite is only for band combinations with FR1 and FR2 bands.  |
| Qualcomm Incorporated | No | Agree with the intention, but we do not see the need of clarifying it. |
| Intel | Yes | Ok with this change. The intention is to support a UE that only supports intra-FR NR-DC. And current spec implies that a UE supporting NR-DC also supports FR1-FR2 NR-DC. |
| MediaTek | Yes with comments | We agree with the intent. We are fine with the TP though it seems like a functional NBC change. |
| Samsung | Yes | If there is UE supporting intra-FR (e.g. FR1) NR-DC combination only and ca-ParametersNRDC has to be still reported by the UE for NR-DC support, we should consider the suggested change. |
| vivo | No | Don’t think it is really essential.  |

**Q9: Do companies agree with the second change in the** [R2-2304165](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2303877.zip)/R2-2304166?

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes or No** | **Comments** |
| Ericsson |  | Similar comments as for Q8. |
| ZTE |  | Similar comments as for Q8. |
| Huawei, HiSilicon | Yes(proponent) |  |
| Xiaomi  | Yes  |  |
| CATT |  | Similar comments as for Q8. |
| OPPO |  | Similar comments as for Q8. |
| Apple | No | Similar view as Ericsson. |
| Nokia, Nokia Shanghai Bell | No | See comment in Q8. |
| Qualcomm Incorporated | No | Agree with the intention, but we do not see the need of clarifying it. |
| Intel | Yes | Same comment as Q8 |
| MediaTek | Yes | Same comment as Q8 |
| Samsung | Yes |  |
| vivo | No |  |

For the Q8 and Q9, based on the companies’ inputs, most companies agree with the intention, and companies share the understanding that *ca-parametersNRDC* and *asyncNRDC-r16* can also be used for the intra-FR NR-DC BC. However the most controversial part is whether the CR is essential and half companies don’t think the spec change is needed.

**Proposal 7: RAN2 to confirm that *ca-parametersNRDC* and *asyncNRDC-r16* can also be used for the intra-FR NR-DC BC. Whether spec change is needed can be discussed online.**

## 2.2 Part 2: Intended to progress discussion on agreeable parts

- To be updated after discussion on part 1 -

# 3 Conclusion

- To be updated after discussion on part 1 -

**Proposal 1:**[*R2-2302437*](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2302437.zip) **is proposed to be noted immediately.**

**Proposal 2 RAN2 confirm the following behaviour for the parameters txSwitchImpactToRx and txSwitchWithAnotherBand in srs-TxSwitch:**

* **Bands with UL that impact each other define a group (i.e. SRS TX switching on any of the cells will impact UL on all the cells in the group). All the band entries in the group will signal the same group identifier in txSwitchWithAnotherBand. The first-listed band entry number in the group shall be used as identifier for the group. An UL group with only one band entry is not signaled in txSwitchWithAnotherBand.**
* **For bands where the DL is impacted by an UL group with a single band entry, txSwitchImpactToRx shall indicate the band entry number of that UL band. For bands where the DL is impacted by an UL group with more than one band entry, txSwitchImpactToRx shall point to the UL group using the group identifier number (as defined by txSwitchWithAnotherBand).**

**Proposal 3: RAN2 to discuss whether (and how) the spec change is needed in the next meeting.**

**Proposal 4: Pursue the CRs** [*R2-2303877*](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2303877.zip)*/R2-2303878/R2-2303879***, and update the CRs wording in phase 2 based on the comments.**

**Proposal 5: Agree the CRs** *R2-2303880/R2-2303881*.

**Proposal 6: Agree with the intention of R2-2304161/R2-2304162/R2-2304163/R2-2304164/, update the CRs in the Phase 2 based on the companies’ comments (e.g. ASN.1 coding issue).**

**Proposal 7: RAN2 to confirm that *ca-parametersNRDC* and *asyncNRDC-r16* can also be used for the intra-FR NR-DC BC. Whether spec change is needed can be discussed online.**

# 4 References

1. [R2-2302437](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2302437.zip) LS on clarification on impact of SRS antenna switching for TDD-FDD band combinations (R4-2303633; contact: Huawei) RAN4 LS in Rel-15 NR\_newRAT-Core To:RAN1 Cc:RAN2
2. [R2-2303660](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2303660.zip) Handling of SRS Tx switching capability Ericsson discussion
3. [R2-2303877](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2303877.zip) Miscellaneous Correction on UE capability-R15 ZTE Corporation, Sanechips CR Rel-15 38.306 15.20.0 0895 - F NR\_newRAT-Core
4. [R2-2303878](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2303878.zip) Miscellaneous Correction on UE capability-R16 ZTE Corporation, Sanechips CR Rel-16 38.306 16.12.0 0896 - A NR\_newRAT-Core
5. [R2-2303879](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2303879.zip) Miscellaneous Correction on UE capability-R17 ZTE Corporation, Sanechips CR Rel-17 38.306 17.4.0 0897 - A NR\_newRAT-Core
6. [R2-2303880](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2303880.zip) Correction on PDCCH Blind Detection-R16 ZTE Corporation, Sanechips CR Rel-16 38.306 16.12.0 0898 - F NR\_L1enh\_URLLC
7. [R2-2303881](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2303881.zip) Correction on PDCCH Blind Detection-R17 ZTE Corporation, Sanechips CR Rel-17 38.306 17.4.0 0899 - A NR\_L1enh\_URLLC

1. R2-2304161 Correction on pusch-RepetitionTypeB capability Huawei, HiSilicon CR Rel-16 38.306 16.12.0 0901 - F NR\_L1enh\_URLLC-Core
2. [R2-2304162](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2304162.zip) Correction on pusch-RepetitionTypeB capability Huawei, HiSilicon CR Rel-17 38.306 17.4.0 0902 - A NR\_L1enh\_URLLC-Core
3. [R2-2304163](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2304163.zip) Correction on pusch-RepetitionTypeB capability Huawei, HiSilicon CR Rel-16 38.331 16.12.0 4059 - F NR\_L1enh\_URLLC-Core
4. [R2-2304164](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2304164.zip) Correction on pusch-RepetitionTypeB capability Huawei, HiSilicon CR Rel-17 38.331 17.4.0 4060 - A NR\_L1enh\_URLLC-Core
5. [R2-2304165](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2304165.zip) Corrections on NR-DC capabilities Huawei, HiSilicon CR Rel-16 38.306 16.12.0 0903 - F LTE\_NR\_DC\_CA\_enh-Core
6. [R2-2304166](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2304166.zip) Corrections on NR-DC capabilities Huawei, HiSilicon CR Rel-17 38.306 17.4.0 0904 - A LTE\_NR\_DC\_CA\_enh-Core