**3GPP TSG-RAN WG2 Meeting #109bis-e R2-20XXXXX**

**Electronic, 20 April – 30 April 2020**

**Agenda item: 5.4.1.1**

**Source: Samsung, ZTE Corporation, Sanechips**

**Title: Offline-006: L2 Configuration**

**Document for: Discussion & Decision**

# Introduction

This is a summary of the following offline discussion on L2 parameters and configuration:

* [AT109bis-e][006][NR15] L2 Configuration (Samsung, ZTE)

Scope: Treat R2-2002917, R2-2002948, R2-2002949, R2-2002886

Part 1: Determine which issues that need resolution, find agreeable proposals. Deadline: April 23 0700 UTC

Part 2: For the parts that are agreeable, discussion will continue to agree on CRs

This document covers the following contributions submitted to RAN2#109bis-e meeting:

R2-2002917 Clarification on the presence of ssb-perRACH-Occasion for the CSI-RS based CFRA ZTE Corporation, Sanechips, Ericsson (Rapporteur) CR Rel-15 38.331 15.9.0 1449 1 F NR\_newRAT-Core R2-2000664

R2-2002948 Change of pdcp-Duplication at RRC Reconfiguration Samsung discussion Rel-15 NR\_newRAT-Core

R2-2002949 Clarification on pdcp-Duplication at RRC Reconfiguration Samsung CR Rel-15 38.331 15.9.0 1534 - F NR\_newRAT-Core

R2-2002886 Corrections on the allowedSCS-List and AllowedServingCells in LogicalChannelConfig Samsung CR Rel-15 38.331 15.9.0 1532 - F NR\_newRAT-Core

Companies are invited to provide their views for each issue.

# Discussion: Part 1

## 2.1 Issue #1. Presence of *ssb-perRACH-Occasion* for the CSI-RS based CFRA

The first issue from [**R2-2002917**](http://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_109bis-e/Docs/R2-2002917.zip) is about presence condition of *ssb-perRACH-Occasion.*

In the current TS38.331, the field *ssb-perRACH-Occasion* is mandatory present if the field resources in CFRA is set to ssb; otherwise it is absent, which means this field is absent when the field resources in CFRA is set to csirs.

However, according to the following description in TS38.213, the *ssb-perRACH-Occasion* is still needed for UE to decide the association pattern period and understand the index of the PRACH occasions indicated by *ra-OccasionList*.

------------------------------------------------------From TS38.213- start----------------------------------------------------

*An association pattern period includes one or more association periods and is determined so that a pattern between PRACH occasions and SS/PBCH blocks repeats at most every 160 msec.*

*.....*

*For a PRACH transmission triggered upon request by higher layers, a value of ra-OccasionList [12, TS 38.331], if csirs-ResourceList is provided, indicates a list of PRACH occasions for the PRACH transmission where the PRACH occasions are associated with the selected CSI-RS index indicated by csi-RS. The indexing of the PRACH occasions indicated by ra-OccasionList is reset per association pattern period.*

------------------------------------------------------From TS38.213- end-----------------------------------------------------

Thus, it is suggested in R2-2002917 to change the presence condition of *ssb-perRACH-Occasion* and this field should be mandatory present when the field resources in CFRA is set to ssb or csirs.

**Q1) Do companies agree that *ssb-perRACH-Occasion* is mandatorily present?**

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comments (if any)** |
| Huawei, Hisilicon | Double check needed | Simply changing the presence condition from “conditional absent” to “mandatory” may introduce NBC issues, as the old UE may not store the parameter signalled by the new gNB, and may assume some other parameter used in this case. |
| Ericsson | Yes |  |
| Nokia | Maybe not | We don't fully understand the reason for change - 213 does not mention anywhere the ssb-perRACH-Occasion parameter would be needed to derive the RACH occasions (ROs) with parameter ra-OccasionList. In principle, each RO is an individual RO regardless of how many SSBs is mapped to it and, hence, the indexing with ra-OccasionList should work without the other parameter.  We think this should be checked with RAN1 if this is the case as this is out of RAN2 scope. |
| CATT |  | After checking we tend to agree that there is an issue. Basically, RAN1 spec is so that the association pattern period relates to PRACH occasions and SS/PBCH blocks. So for the case when *resources* is set to csirs ssb-perRACH-Occasion may still be needed.  We can discuss further how to fix this issue. Huawei has a point that this is going to be NBC. |
| Samsung | Yes/No | We think the issue is valid. There is a misalignment between 213 and RRC spec. So, we need to resolve it.  We also tend to agree with Huawei and CATT that it may introduce NBC issues of ASN.1. To avoid NBC issue, we could have an alternative option to clarify in RAN1 spec as follows  *The indexing of the PRACH occasions indicated by ra-OccasionList is reset per rach configuration period.*  Note that both (RRC change or PHY change) will have interoperability issue. |
| LG |  | We think this seems an issue, but RAN1 needs to check whether this should be resolved. |
| ZTE | Yes | According to the description in 213 that “The indexing of the PRACH occasions indicated by *ra-OccasionList* is reset per association pattern period.”, the RO with index 0 will be located on the radio frame where SFN mod n = 0, and the n is the association pattern period, which is derived based on the ssb-perRACH-Occasion.  We agree the CR is literarily NBC. However, considering the change proposed is essential for the CSI-RS based CFRA (i.e. without the IE ”ssb-perRACH-Occasion”, the CSI-RS based CFRA seems not work), we hope all the UEs in the market have the same understanding as the CR proposed. Otherwise, the NW has to disable the CSI-RS based CFRA for all the legacy UE and a new capability shall be introduced for the NW to identify the UE which can support the CSI-RS based CFRA. |
| QCOM | Yes | We support the intention and the change proposed by the CR |
| NTT DOCOMO | Yes | Although the change results in NBC, strictly speaking, it is also clear that ssb-perRACH-Occasion is needed for the case of CSI-RS. We’re also O.K with the alternative proposed by Samsung. On the other hand anyway, it also looks like NBC. |
| Apple |  | We acknowledge the misalignment between RAN1 and RAN2 spec, but would like to double check it with RAN1. |
| MediaTek | Yes | We support the intention. We understand there may be some NBC concern but it seems that original feature is somehow broken. Thus we are fine with the change. |

*< Rapporteur’s Summary >*

*10 companies acknowledge that the issue raised in this CR is valid.*

*5 companies support the RAN2 solution in this CR (i.e. change the presence condition of ssb-perRACH-Occasion into “Cond Mandatory”).*

*2 companies propose to have RAN1 solution (i.e. change the RAN1 spec to show that the indexing of the PRACH occasions indicated by ra-OccasionList is reset per rach configuration period instead of per association pattern period.)*

*4 companies would like to double check considering the change (no matter we go for RAN1 solution or RAN2 solution) would be NBC.*

*Considering the CR is targeted to a Rel-15 function and the change proposed is literally NBC, more time will be allowed for companies to do further check, especially for current implementation on UE side, and the proposed solutions can be discussed in this offline discussion part 2 based on the feedback from internal checking.*

**Proposal 1. Select one from the following two solutions to have consistent understanding between RAN1 and RAN2 on the configuration of CSI-RS based CFRA:**

* **Option 1(RAN2 solution): Change the presence condition of *ssb-perRACH-Occasion* in CFRA into “Cond Mandatory”.**
* **Option 2(RAN1 solution): Confirm the issue from RAN2 aspect, and send LS to RAN1 to double check the issue and also inform RAN1 the potential solution proposed in the CR.**

## 2.2 Issue #2. Change of *pdcp-Duplication* at RRC Reconfiguration

The next issue is whether the value of *pdcp-Duplication* IE in *PDCP-config* can be changed or not. This issue was discussed in RAN2#108 but postponed without any conclusion. Since this issue is related with Rel-16 IIOT discussion on initial state. A contribution [**R2-2002948**](http://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_109bis-e/Docs/R2-2002948.zip) and corresponding CR [**R2-2002949**](http://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_109bis-e/Docs/R2-2002949.zip) are proposing to have a decision.

In the contribution, Samsung sees that value of *pdcp-Duplication* can be changed due to the following reasons:

1. Current specifications does not prohibit but seems to allow the change.
   * In MAC specification, it is explicitly indicated that “The PDCP duplication for the configured DRB(s) is activated and deactivated by indication by RRC.” Although the original intention was initial state, the description does not say anything about in the current text.
   * In PDCP specification, there is no expression on activation by “lower layer” or “MAC CE”. Our understanding is that since activation/deactivation by RRC is possible, lower layer indication cannot be specified here.
   * In RRC specification, the field description of *pdcp-Duplication* explicit says that it is uplink duplication status “at the time of receiving this IE”, not configuration of this field. The field description also mentions that the value indicates “the initial state of the duplication.” In sum, we could interpret as initial state at the time of receiving the IE.
2. UE behaviour at reconfiguration is not clear if the initial value cannot be changed.
   * Assuming current duplication status is different from the initial state and UE receives the reconfiguration, it is not clear if UE falls back to the original initial state or ignore it. Both ways are not efficient.
     + If UE falls back to the original initial state, gNB may need to send a MAC CE immediately after the configuration, for NW’s intended duplication. The data transmission with duplication might be delayed. This case can happen frequently in handover scenario.
     + If UE ignores the initial state, gNB should include *pdcp-Duplication* set to the original configuration which is not used by UE at all. There will be a meaningless signalling.

The corresponding CR proposes the following changes:

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| ***pdcp-Duplication***  Indicates whether or not uplink duplication status at the time of receiving this IE is configured and activated as specified in TS 38.323 [5]. The presence of this field indicates that duplication is configured. PDCP duplication is not configured for CA packet duplication of LTE RLC bearer. The value of this field, when the field is present, indicates the state of the duplication at the time of receiving this IE. If set to *true*, duplication is activated. The value of this field is always *true*, when configured for a SRB. |

Note that detailed wording can be improved during part 2 discusison. .

**Q2) Do companies agree that the value of *pdcp-Duplication* can be changed by RRC reconfiguration?**

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comments (if any)** |
| Huawei, Hisilicon | Yes | We assume the existing wording in RRC already allows change/reconfiguration of this parameters, but also fine to clarify this understanding. |
| Ericsson | No | In RAN2-NR#2 meeting, the following agreements were made regarding PDCP duplication:   1. MAC CE enables per DRB control of activation/deactivation of packet duplication for DRBs with packet duplication configured by RRC.   Further, in RAN2 AH1801, the following agreements were made:   1. When configuring duplication, RRC can also set the initial state (active or inactive) for DRBs. 2. If SRB is configured to use duplication, the state is always active   This it means that the RRC configures the initial state of the PDCP duplication that in case of SRB is always “activated” and in case of DRB can be “activated” or “deactivated”.  Then, in case of DRB the MAC CE is used to control the PDCP duplication state (that is NOT the initial state) and switch it between inactive or active.  Given this, in the field description of pdcp-duplication in 38.331, is clearly state that “The value of this field, when the field is present, indicates the initial state of the duplication.”  Therefore, the current RRC specification is in line with the agreement and nothing needs to be clarified. In top of this, **what Samsung is proposing here is a big NBC** that should not be pursued at this stage of Rel-15. |
| Nokia | Yes | * We think the “initial state” always refers to the case when UE receives the IE and hence would say this was already allowed. * We don’t recall a discussion the state would not be allowed to be changed by RRC, e.g., upon duplication reconfiguration. Or why would it be disallowed? * Hence we think this is intended by the current description and how it should be, at least for HO case.   Agree also with Huawei that the CR from Samsung seems fine and makes it clearer. |
| Samsung | Yes | It is not an NBC at all, but a “correction with inter-operability issue.” If all companies have the same understanding and only Samsung tries a functional change, it may be considered as an NBC. But it is not true. Even if change of value is not allowed, it may lead the inter-operability issue due to the different understanding among companies.  Since the reality is that companies have different understanding and there was no clear majority in RAN2#108, we think we have to conclude at least what is the correct understanding in this meeting.  Anyway, our view is that it can be changed by RRC configuration, as described above. |
| LG | Yes | Our understanding is that the PDCP duplication can work even without MAC ignalling. The “initial state” means that the state when this IE is received. |
| ZTE | Yes | We also think the “initial state” refer to the state when the newly received RRC configuration is applied, and the CR from Samsung seems fine for us. |
| QCOM | Yes | We agree that it is not explicitly prohibited in spec to change the value of the IE and we think it is ok to allow change of value at reconfiguration |
| NTT DOCOMO | Yes | We share the same view as Nokia mentioned. The initial state can be regarded as when the UE receives the IE, no matter if it is received before. Given that the spec can be read as such, we also support the CR. |
| Apple | Yes | Our understanding is that the PDCP duplication state is allowed to be indicated via RRC signaling. |
| MediaTek | Yes | We share the same view as Qcom, there is no explicit prohibition for RRC to reconfigure this. |

*< Rapporteur’s Summary >*

*All companies except one company agree that the value of pdcp-Duplication can be changed and the current behavior is the same.*

**Proposal 2. RAN2 confirms that the value of pdcp-Duplication can be changed by RRC reconfiguration.**

## 2.3 Issue #3. Corrections on the *allowedSCS-List* and *allowedServingCells* in *LogicalChannelConfig*

According to the field descriptions of allowedSCS-List/ServingCells, UE apples any configured numerologies/serving cells if this field is absent, but the current need code of both fields is Need R (i.e. UE release this field if this field is absent). However, MAC specification describe the UE behaviour when they are not configured (or released).

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| **TS 38.321**  5.4.3.1.2              Selection of logical channels  The MAC entity shall, when a new transmission is performed:  1>  select the logical channels for each UL grant that satisfy all the following conditions:  2>  the set of allowed Subcarrier Spacing index values in *allowedSCS-List*, if configured, includes the Subcarrier Spacing index associated to the UL grant; and  2>  *maxPUSCH-Duration*, if configured, is larger than or equal to the PUSCH transmission duration associated to the UL grant; and  2>  *configuredGrantType1Allowed*, if configured, is set to *true* in case the UL grant is a Configured Grant Type 1; and  2>  *allowedServingCells*, if configured, includes the Cell information associated to the UL grant. Does not apply to logical channels associated with a DRB configured with PDCP duplication within the same MAC entity (i.e. CA duplication) for which PDCP duplication is deactivated. |

What UE should do when the field is not configured, is a separate aspects i.e. it should not affect the need code. There are 2 cases in which UE can end up with field not being configured:

a) not configured so far,

b) configured initially and later absent/ released.

The need code is relevant for b), but it is not exactly explained based on the UE behaviour in MAC specification. The proposal of a CR [**R2-2002886**](http://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_109bis-e/Docs/R2-2002886.zip) is to align the text in the field description to MAC specification.

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| ***allowedSCS-List***  If configured, UL MAC SDUs from this logical channel can only be mapped to the indicated numerology. Otherwise, UL MAC SDUs from this logical channel can be mapped to any configured numerology. Only the values 15/30/60 kHz (for FR1) and 60/120 kHz (for FR2) are applicable. Corresponds to ‘allowedSCS-List’ as specified in TS 38.321 [3]. |
| ***allowedServingCells***  If configured, UL MAC SDUs from this logical channel can only be mapped to the serving cells indicated in this list. Otherwise, UL MAC SDUs from this logical channel can be mapped to any configured serving cell of this cell group. Corresponds to ‘allowedServingCells’ in TS 38.321 [3]. |

**Q3) Do companies agree the TP above, i.e.** CR [**R2-2002886**](http://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_109bis-e/Docs/R2-2002886.zip)**?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments (if any)** |
| Huawei, Hisilicon | Maybe No | We think “if present” is appropriate for “Need R” fields in RRC spec, and it is ok for other specs (e.g. MAC or PHY) using “if configured”. We don’t see an ambiguity here. |
| Ericsson | No | In general, we think there is no room for any of such misunderstanding at this stage of Rel-15. Therefore, strictly speaking this CR is not needed.  Further, we note that this is related to some TEI16 issues addressed in see R2-2002741. Therefore, if companies are eager to have such change, we would be ok to keep this on hold for now until the TEI16 CR is handled. Yes, this is Rel-15 and TEI16 is Rel-16, but this would need a shadow for Rel-16 and then it could become messy. |
| Nokia | No | Fully agree with Ericsson and Huawei. Samsung seems to have confused the understanding of the field description with an already configured value. Hence no need for the CR in our view. |
| CATT | No | In our understanding nothing is broken with the current field description and texts in MAC. |
| Samsung | Yes | Need code should indicate what UE does in case field is absent, which in this case is to release the field.  We think that this “if present + otherwise” only covers the above b) case (i.e. configured initially and later absent/ released) but it seems the required description could cover case a) as well i.e. not configured so far. In other words, covering case a) means describing the default operation which this field is not configured so far.  That is, “Otherwise, UL MAC SDUs from this logical channel can be mapped to any configured serving cell of this cell group.” Is the counter operation of that “if allowedServingCells is not configured” from our understanding.  In that sense, field descriptions above should start with “if configured” not for “if present” if we strictly apply the logic. |
| LG | Maybe No | We have same understanding as Huawei. But, we are ok to change as Samsung suggested. |
| ZTE | No | We also think there is no room for misunderstanding. |
| QCOM | Maybe | The CR doesn’t introduce any behavior changes, since the IE’s are Need R, so being present or configured, will carry the same behavior. Not sure if CR is needed. |
| NTT DOCOMO | No | Even if the field description follows the sentence used for need codes, i.e. “if present, otherwise…”, we agree with Qualcomm that it could be read as a) (not configured so far), since anyway the need code is Need R. |
| Apple | No | We donot see any ambiguity issue. |
| MediaTek | Maybe not | Not sure what is really changed. We think that original wording is fine. |

*< Rapporteur’s Summary >*

*No support for the CR. Companies see no ambiguity.*

**Proposal 3. CR R2-2002886 is not pursued.**

# Conclusion: Part 1

Based on the above, RAN2 is request to agree the following proposals:

**Proposal 1. Select one from the following two solutions to have consistent understanding between RAN1 and RAN2 on the configuration of CSI-RS based CFRA:**

* **Option 1(RAN2 solution): Change the presence condition of *ssb-perRACH-Occasion* in CFRA into “Cond Mandatory”.**
* **Option 2(RAN1 solution): Confirm the issue from RAN2 aspect, and send LS to RAN1 to double check the issue and also inform RAN1 the potential solution proposed in the CR.**

**Proposal 2. RAN2 confirms that the value of pdcp-Duplication can be changed by RRC reconfiguration.**

**Proposal 3. CR R2-2002886 is not pursued.**