3GPP TSG-RAN WG2 Meeting #117 Electronic R2-2203729

Online, Feb 21st – Mar 3rd, 2022

Agenda Item: 8.24.2

Source: Ericsson

Title: Summary of [AT117-e][060][NR17] DSS (Ericsson)

Document for: Discussion, Decision

# 1 Introduction

This contribution summarizes the following discussion:

* [AT117-e][060][NR17] DSS (Ericsson)

Scope: Treat R2-2202214, R2-2202215, R2-2202216. Take into account an expected RAN1 LS to resolve Open issues for CR in R2-2202216. If the expected LS arrives late, e.g. at EOM, the discussion can be continued as a Post meeting discussion.

Intended outcome: Report, Agreed CRs

Deadline: EOM.

Contact person(s) for each participating company:

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

## 2.1 Phase 1

Only three papers [1][2][3] are submitted. They are all from the WI rapporteur with the intent to finalize this RAN1-led item. There is no RAN2-related technical discussion, for example, on MAC enhancements. The reason is that there were no additional inputs from RAN1 since the last RAN2 meeting (RAN2#116bis).

What remains is the discussion on the stage-2 CR and the RRC CR.

**Stage-2 CR**

In the RAN2#116 meeting, the stage 2 running CR for DSS is endorsed. The CR is based on the text proposal in the RAN1 LS. There were no further RAN1/2 progress that requires the stage 2 update. The CR R2-2202215 [2] is a resubmission with cover sheet update.

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| [R2-2111542](http://www.3gpp.org/ftp//tsg_ran/WG2_RL2/TSGR2_116-e/Docs//R2-2111542.zip) stage2 38.300 running CR for DSS Ericsson draftCR Rel-17 38.300 16.7.0 NR\_DSS   * [026] Endorsed |

**Q1. Can the stage-2 CR R2-2202215 be agreed? If no, please indicate why.**

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| --- | --- | --- |
| **Company** | **Yes, No?** | **Comments** |
| Huawei, HiSilicon | Yes |  |
| Ericsson | Yes |  |
| ZTE | Yes |  |
| Nokia, Nokia Shanghai Bell | Yes but | The CR is missing the cross-references to the other RAN2 CRs. These should be added to the cover page. |
| Apple | Yes but | The CR is using an outdated cover sheet, *CR-Form-v12.2* is the latest version. |
| Intel | Yes but | One comment from Juha’s CR cover check should be addressed, i.e., “Is the work item code NR\_DSS\_enh correctly spelled on the work item code field?” |
| Samsung | Yes |  |
| OPPO | Yes |  |

**Summary**

All companies are fine with the content of the CR, but three companies have comments on the cover sheet.

1. The CR R2-2202215 can be agreed with updates on the CR coversheet.

**RRC CR**

The running RRC CR was endorsed as R2-2201946. The submitted R2-2202216 CR [3] contains one clarification in the IE *PDCCH-Config*, compared to the last endorsed version. This is to capture that SpCell can be both a self-scheduling and a scheduled cell. The marked change is shown below:

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| If this IE is used for the scheduled SCell in case of cross carrier scheduling, the fields other than *searchSpacesToAddModList* and *searchSpacesToReleaseList* are absent. |

Rapporteur proposes to collect views on if the updated CR R2-2202216 can be endorsed. If endorsed, it will be the basis for the further discussion to capture RAN1 progress.

**Q2. Can the CR R2-2202216 be endorsed? If no, please indicate why.**

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| --- | --- | --- |
| **Company** | **Yes, No?** | **Comments** |
| Huawei, HiSilicon | See comments | For the additional change to PDCCH-Config, we are not sure if this is the only case to be corrected, as we can also find similar text in SearchSpace. There might be some more and need more time checking. – *SearchSpace* The IE *SearchSpace* defines how/where to search for PDCCH candidates. Each search space is associated with one *ControlResourceSet*. For a scheduled cell in the case of cross carrier scheduling, except for *nrofCandidates*, all the optional fields are absent (regardless of their presence conditions).  Maybe we can leave the current spec as it is with the understanding that “cross carrier scheduling without explicitly indication of enhanced R17 behavior only refer to legacy operation” since it might be the more robust and cleaner. |
| Ericsson | Yes | Agree with Huawei that there is a need to check the above highlights. The reason why it was not considered in this CR is that in the last meeting’s email discussion [R2-2201698](http://www.3gpp.org/ftp//tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs//R2-2201698.zip). It was concluded in Issue 5 that  **Conclusion 3 Wait for further RAN1 inputs (if any) on if/how to capture search space linkage in the RRC spec.**  It is recently agreed in this RAN1 meeting that  Agreement   * When UE is configured for CCS from sSCell to P(S)SCell, and if SS set (x\_p) of P(S)Cell and SS set (x\_s) of sSCell are configured with same *searchSpaceId* value   + x\_s is used for CCS from sSCell to P(S)Cell (Note: already agreed)   + x\_s can be used for sSCell self-scheduling   + x\_p is not used for P(S)Cell self-scheduling and parameters other than *searchSpaceId* and *nrofCandidates* are not configured for that SS set * Note: RAN2 spec may need some update, but it depends on RAN2 decision.   <https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_108-e/Inbox/Xiaodong_sessions/Xiaodong%27s%20Session%20Notes%20RAN1%23108-e%20(8.13%20DSS)%20v01.zip>  We can kick-off this discussion in the phase 2. |
| ZTE | See comments | We are fine with the update for PDCCH-Config. Regarding the update for SearchSpace, we can try to implement this in the phase 2 discussion based on RAN1 agreement or input (if received). |
| Nokia, Nokia Shanghai Bell | See comments | For the change in PDCCH-Config, let's add an FFS and search the RRC for all similar cases. Otherwise we easily just change one place and forget others. |
| Apple | See comments | Agree with Nokia on the change in PDCCH-Config.  The CR should be updated to use the latest cover sheet version in *CR-Form-v12.2*. |
| Intel | see comments | Agree with Nokia.  same comment on cover sheet from Juha, “Is the work item code NR\_DSS\_enh correctly spelled on the work item code field?” |
| Samsung | Yes | We agree with the intention of restricting the use case of this field. And also have the same view with Huawei that there could be more part to apply this restriction. |
| OPPO | Yes | Agree with the change, but we also agree with Huawei, we can check others as similar change. |

**Summary**

All companies are fine with the CR, but all agree that a thorough checking on RRC spec for similar changes are needed to reflect that SpCell can be both a self-scheduling and a scheduled cell. At the moment, it is clear the description of the *searchSpace* needs to be updated.

1. The CR R2-2202216 can be endorsed as the baseline. RAN2 to further update RRC CR.

The paper [1] states that the below three issues are RAN1 related and up-to RAN1 to resolve:

1. Exact value of the field *ccs-BlindDetectionSplit-r17*. This will be discussed in RAN1#108;
2. Alignment of the field name *ccs-BlindDetectionSplit* with the RAN1 specs;
3. Clarification (if needed) for the field *enableDefaultBeamForCCS*.

The proposal is to wait for RAN1 progress, e.g., by LS. After receiving the LS, RAN2 can update the RRC CR and submit to the RAN plenary. Since there are no other inputs, rapporteur proposes to collect views if there are any missing aspects.

**Q3. If there are any missing aspects, companies are invited to provide in the below table**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Huawei, HiSilicon | We are fine with the proposed WA. But we are wondering if RAN2 can discuss whether it is allowed to configure SCell deactivation timer to sSCell. We understand if this IE is absent from the ServingCellConfig, it will indicate to apply the value infinity. So from the spec and also implementation point, a timer with “infinity” is different from that without a timer. So we see another possibility is not configure this timer to sSCell, similar to PUCCH SCell. |
| Ericsson | The above point was brought up previously in R2-2111459, and the conclusion is to wait for further RAN1 inputs, see Q3c and one answer therein.  The current specification is a bit ambiguous. In RRC spec, it states that the field is absent for PUCCH SCell, but at the same time, it states that if the filed is absent, the timer applies value “infinity” (without ruling out PUCCH SCell). This means that the SCell de-activation timer for PUCCH SCell has value infinity. In MAC spec, it states that there is no timer for the PUCCH SCell. Nevertheless, functional-wise, they are the same, since if the timer value is infinity, then it never expires. It might be tricky if there are some procedure texts in MAC that would stop the timer, but we haven’t found any for the SCell de-activation timer yet.  RRC:  ***sCellDeactivationTimer***  SCell deactivation timer in TS 38.321 [3]. If the field is absent, the UE applies the value infinity.  MAC:  - configuring *sCellDeactivationTimer* timer per configured SCell (except the SCell configured with PUCCH, if any): the associated SCell is deactivated upon its expiry;  We acknowledge that most likely the network may not configure this timer, and it means that the timer value is infinity. Restricting that no such timer for scheduling SCell is also fine in our view, but it may limit the configuration flexibility in which the network may configure the timer with non-infinity value.  We are fine if there are more companies that want to further discuss this. If so, we propose to include it in the phase 2 of this email discussion. |
| ZTE | For the SCell deactivation timer, we see no strong need to restrict that no such timer is configured for scheduling SCell. Anyway it can be up to NW implementation, e.g. to configure the timer value as infinity. |
| Nokia, Nokia Shanghai Bell | On SCell deactivation timer, we agree with ZTE: This is up to (sensible) network configuration and the current RRC already allows for everything to work. So it's best to do nothing for now. |
| Apple | We are fine to discuss the SCell deactivation timer in phase 2. |
| Samsung | Regarding the Scell deactivation timer, we think applying the legacy manner as normal Scell, i.e., configuring with ‘absent field’ seems better, and this will mean the infinity. Reason is, as Ericsson said, not to limit the configuration flexibility. In some cases, with finite timer value, still network can switch the UE from CCS to the normal scheduling near the timer expiry via further RRC configuration. |
| OPPO | We agree with the WF.  For SCell deactivation timer, if the SCell is configured to schedule other SCell, the SCell deactivation timer can be configured for this SCell. If the SCell is configured to schedule PSCell, I think the SCell deactivation timer can not be configured because the PScell will be never deactivated. |

**Summary:**

Seven companies provide input on the SCell de-activation Timer. Except Apple, all companies seem to have provided their preferences. Four companies (Ericsson, ZTE, Nokia, Samsung) have the view that it is up-to network implementation and there is no need to restrict that *SCellDeactivationTimer* cannot be configured for the scheduling SCell. OPPO and Huawei want to further discuss these. It seems that a slight majority view is that there is no need for such a restriction. Rapporteur proposes to take this input into account and further discuss this in the phase 2

1. To further discuss in the phase 2 the need to restrict the network to configure *SCellDeactivationTimer* for the scheduling SCell.

## 2.2 Phase 2

### 2.2.1 SCell Deactivation Timer

*SCellDeactivationTimer* cannot be configured for the PUCCH SCells. This is restricted in the RRC configuration. There are proposals to dis-allow *ScellDeactivationTimer* to be configured for the scheduling SCell for the SpCell. A slight majority companies indicate in phase 1 that there is no such a need and, if needed, it can rely on network implemenation not to configure the timer. The below question is to collect further views on this aspect.

**Q4: Do companies agree that there is no need to dis-allow *SCellDeactivationTimer* to be configured for the scheduling SCell for the SpCell?**

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| --- | --- | --- |
| **Company** | **Yes or No?** | **Detailed comments** |
| Huawei, HiSilicon | No but | We believe that the intention of forbidding SCellDeactivationTimer to be configured to PUCCH SCell is not meant to a “infinity” value, which is clear from the LTE RRC spec (we admit there might be deficiency in NR RRC ASN.1). And we don’t see it would restrict the NW flexibility since NW can still “deactivate” sSCell via MAC CE/RRC reconfig.  But we are fine with majority. |
| Apple | Yes | It seems better not to restrict configuration flexibility at this stage. If RAN1 turns out to agree proposals of complicated impact for PDCCH monitoring switching, RAN2 can re-evaluate the behavior. |
| ZTE | Yes | Agree with Apple. |
| Ericsson | Yes | The NW flexibility is to configure *SCellDeactivationTimer* for the scheduling SCell. |
| Samsung | Yes | The infinity value still can work for the intended sSCell’s operation w.r.t. CCS, i.e., sSCell will not be deactivated. So it is enough to allow configuring the timer to sSCell as legacy. |

### 2.2.2 RAN1 parameters

RAN1 in the parallel RAN1 meeting (RAN1#108) agree the below. Please check

[Xiaodong’s Session Notes RAN1#108-e (8.13 DSS) v01.zip](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_108-e/Inbox/Xiaodong_sessions/Xiaodong%27s%20Session%20Notes%20RAN1%23108-e%20(8.13%20DSS)%20v01.zip)

The RAN1 email discussion can be found in the below folder

<https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_108-e/Inbox/drafts/8.13.1>

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| --- |
| Agreement  * (RRC parameter *Pcell-CCSscaling* in RAN1 specs) is configured from below value set   + {1/7, 3/14, 2/7, 3/7, ½, 5/7, [reserved1], [reserved2]}  Conclusion  * For a UE configured with cross-carrier scheduling from a sSCell to Pcell/PSCell, *enableDefaultBeamForCCS* can be configured in *CrossCarrierSchedulingConfig* in the Pcell/PSCell, which configures default beam determination for a PDSCH on the Pcell/PSCell scheduled by a PDCCH on the sSCell   Agreement   * When UE is configured for CCS from sSCell to P(S)Scell, and if SS set (x\_p) of P(S)Cell and SS set (x\_s) of sSCell are configured with same *searchSpaceId* value   + x\_s is used for CCS from sSCell to P(S)Cell (Note: already agreed)   + x\_s can be used for sSCell self-scheduling   + x\_p is not used for P(S)Cell self-scheduling and parameters other than *searchSpaceId* and *nrofCandidates* are not configured for that SS set * Note: RAN2 spec may need some update, but it depends on RAN2 decision. |

***enableDefaultBeamForCCS***

The below is the editor’s note in the running CR

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| Editor’s note: It is not clear to which cell this parameter can be configured, e.g., in a cross-carrier scheduled Scell, in a cross-carrier scheduled SpCell, or both. The assumption is that the configuration restriction is captured in RAN1 specs (as was in the Rel-16), and it is up-to RAN1 to decide/indicate if a further RRC field description clarification is needed. |

RAN1 concluded that

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| For a UE configured with cross-carrier scheduling from a sSCell to Pcell/PSCell, *enableDefaultBeamForCCS* can be configured in *CrossCarrierSchedulingConfig* in the Pcell/PSCell, which configures default beam determination for a PDSCH on the Pcell/PSCell scheduled by a PDCCH on the sSCell. |

Per rapporteur’s understanding, the legacy field *enableDefaultBeamForCCS-r16* is configured in the cross-scheduled Scell instead of the scheduling cell. The parameter is introduced by RAN1, see parameter list R1-2003190. The RAN1 conclusion extends this understanding in the case that when the SpCell is cross-scheduled by Scell. Rapporteur proposes to collect views on if this is the understanding among the companies.

**Q5: Do companies agree that** *enableDefaultBeamForCCS* **can only be configured in the *CrossCarrierScheulingConfig* of the scheduled cell (including both Scell and SpCell)? If no, please indicate clearly the understanding.**

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| --- | --- | --- |
| **Company** | **Yes or No?** | **Detailed comments** |
| Huawei, HiSilicon | Yes | Agree |
| Apple | See comment | Even though the parameter applies to a cross-carrier scheduled PDSCH / Scell only, the RRC signalling seems still allowed on scheduling and scheduled cell. That’s a little ambiguous, although the meaning or applicability of the parameter is clarified. Thus, we would prefer to capture the RAN1 conclusion in the RRC spec. With that, the editor’s note can be resolved. |
| ZTE | Yes |  |
| Ericsson | Yes |  |
| Samsung | Yes |  |

If companies reply yes, then the next question is whether there is a need to clarify this in the RRC field description.

**Q6: If reply yes in Q5, do companies agree to capture this in the RRC field description?**

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| --- | --- | --- |
| **Company** | **Yes or No?** | **Detailed comments** |
| Huawei, HiSilicon | No | If we agreed to capture something, the issue is to some extent to clarify this, only for CCS from SCell to PCell, or for both R17 and legacy CCS? We think it would be better explained in RAN1 spec and RAN2 just uses a reference as in legacy.  ***enableDefaultBeamForCCS***  This field indicates whether default beam selection for cross-carrier scheduled PDSCH is enabled, see TS 38.214 [19]. If not present, the default beam selection behaviour is not applied, i.e. Rel-15 behaviour is applied. |
| Apple | Yes | See our reply to Q5, it will be good to capture that *enableDefaultBeamForCCS* can only be configured in the *crossCarrierSchedulingConfig* of the scheduled cell (including both SCell and SpCell). If companies cannot agree then we are also fine to keep the EN until the RAN1 agreement is reflected in RAN1 specs. |
| ZTE | No | We share the same view with Huawei that it seems better to capture this in RAN1 spec as legacy. |
| Ericsson | Preferably yes | The field description restriction is typically captured in the RRC spec.  TS 38.214 uses the below terminology.   * UE is not configured with *enableDefaultBeamForCCS* * UE is configured with *enableDefaultBeamForCCS*   Without checking the other details, it seems unclear where the field can be configured.  The intention is to clarify for both R17 and legacy CCS. We can understand Huawei’s concern on interpreting the legacy behavior in a Rel-17 CR, but this seems to be unavoidable when introducing Rel-17 features. As long as the Rel-16 feature is not changed, it is okay in my view.  In any case, we are also fine to let RAN1 specs to capture these. In other words, keep the EN would be acceptable. |
| Samsung | Yes | We prefer direct explanation. |

***searchSpace set linking***

In the case of search space set linking, RAN1 agrees the below and it follows the legacy mechanism.

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| Agreement   * When UE is configured for CCS from sSCell to P(S)SCell, and if SS set (x\_p) of P(S)Cell and SS set (x\_s) of sSCell are configured with same *searchSpaceId* value   + x\_s is used for CCS from sSCell to P(S)Cell (Note: already agreed)   + x\_s can be used for sSCell self-scheduling   + x\_p is not used for P(S)Cell self-scheduling and parameters other than *searchSpaceId* and *nrofCandidates* are not configured for that SS set   Note: RAN2 spec may need some update, but it depends on RAN2 decision. |

The search Space IE has the below explanation.

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| – *SearchSpace* The IE *SearchSpace* defines how/where to search for PDCCH candidates. Each search space is associated with one *ControlResourceSet*. For a scheduled cell in the case of cross carrier scheduling, except for *nrofCandidates*, all the optional fields are absent (regardless of their presence conditions). |

The search Space Id has described that the search spaces with the same searchSpaceId value are linked to each other.

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| ***searchSpaceId***  Identity of the search space. SearchSpaceId = 0 identifies the *searchSpaceZero* configured via PBCH (MIB) or *ServingCellConfigCommon* and may hence not be used in the *SearchSpace* IE. The *searchSpaceId* is unique among the BWPs of a Serving Cell. In case of cross carrier scheduling, search spaces with the same *searchSpaceId* in scheduled cell and scheduling cell are linked to each other. The UE applies the search space for the scheduled cell only if the DL BWPs in which the linked search spaces are configured in scheduling cell and scheduled cell are both active.  For an IAB-MT, the search space defines how/where to search for PDCCH candidates for an IAB-MT. Each search space is associated with one ControlResearchSet. For a scheduled cell in the case of cross carrier scheduling, except for nrofCandidates, all the optional fields are absent. |

From rapporteur’s point of view, the only thing that needs to be clarified is the description of the IE search space. Note that the *searchSpaceId* is mandatory present in the IE. In the legacy, a scheduled SCell cannot be self-scheduling while the SpCell (if cross carrier scheduled) can also be self-scheduling. Thus, the newly added text is wordier to correctly capture those. One TP is as below:

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| --- |
| – *SearchSpace* The IE *SearchSpace* defines how/where to search for PDCCH candidates. Each search space is associated with one *ControlResourceSet*. For a scheduled SCell in the case of cross carrier scheduling, except for *nrofCandidates*, all the optional fields are absent (regardless of their presence conditions). For a scheduled SpCell in the case of the cross carrier scheduling, if the search space is linked to another search space in the scheduling SCell, all the optional fields of this search space in the scheduled SpCell are absent (regardless of their presence conditions) except for *nrofCandidates*. |

**Q7: Do companies agree the above TP to capture the search space set linking ? If no, please provide detailed comments**

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| --- | --- | --- |
| **Company** | **Yes or No?** | **Detailed comments** |
| Huawei, HiSilicon | Yes |  |
| Apple | Yes | The TP also seems in line with the principle of Alt2 in R2-2201396 proposed by vivo at R2#116bis-e. |
| ZTE | Yes, but | We wonder whether the text “For a scheduled cell in the case of cross carrier scheduling, except for nrofCandidates, all the optional fields are absent.” (see the yellow highlighted part above) in the filed description of searchSpaceId should also be updated accordingly, to avoid the misalignment between the description of the IE SearchSpace and the filed description of searchSpaceId.  Or we can simply remove this redundant description in the filed description of searchSpaceId considering that the description of the IE SearchSpace is clear enough. |
| Ericsson | Yes | @ZTE  Thank you for the comments.  The yellow highlight part is added by the IAB WI in the CR R2-2002406, not from the baseline RRC spec in Rel-15. It seems to me that this sentence is applicable only for IAB-MT. One approach is to re-write the field description so that it applies only for IAB-MT. The below is one example.  For an IAB-MT, the search space defines how/where to search for PDCCH candidates for an IAB-MT; each search space is associated with one ControlResearchSet; for a scheduled cell in the case of cross carrier scheduling, except for nrofCandidates, all the optional fields are absent. |
| Samsung | Yes |  |

### 2.2.3 Others

There are comments in the phase 1 that RAN2 check thoroughly the need to update the field description to allow SpCell also to be self-scheduling, similar to the change in the IE PDCCH-Config and the SearchSpace. Rapporteur has not found yet any need beyond these two IEs. The below is to collect further inputs on these from companies. Companies can also provide inputs for other missing issues.

**Q8. If there are any missing aspects, companies are invited to provide in the below table**

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| **Company** | **Detailed comments** |
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|  |  |

# 3 Conclusion

TBD

# 4 References

1. R2-2202214 Plan for finalization of Rel-17 DSS in RAN2 Ericsson discussion NR\_DSS\_enh
2. R2-2202215 Introduction of NR dynamic spectrum sharing Ericsson CR Rel-17 38.300 16.8.0 0400 - B NR\_DSS\_enh
3. R2-2202216 Introduction of NR dynamic spectrum sharing Ericsson CR Rel-17 38.331 16.7.0 2878 - B NR\_DSS\_enh