3GPP TSG-RAN WG2 Meeting #116bis electronic R2-220xxxx

Online, January 17-25, 2022

Agenda Item: 8.24.2 RAN1 Led Items

Source: Ericsson

Title: Summary of [AT116bis-e][042][NR17] DSS (Ericsson)

Document for: Discussion, Decision

# 1 Introduction

This contribution summarizes the following discussion:

* [AT116bis-e][042][NR17] DSS (Ericsson)

Scope: Treat R2-2200294, R2-2201039, R2-2201040, R2-2201396, R2-2201618. If possible, offline only, if needed CB W2. 1 Determine Agreeable parts 2 Update Running CR(s) to reflect agreeable parts.

Intended outcome: Report, Endorsed updated CR.

Deadline: Friday W1

[R2-2200294](http://www.3gpp.org/ftp//tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs//R2-2200294.zip) DSS and RA Procedure Samsung Electronics Co., Ltd discussion Rel-17 LTE\_NR\_DC\_enh2

[R2-2201039](http://www.3gpp.org/ftp//tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs//R2-2201039.zip) RRC running CR for DSS Ericsson draftCR Rel-16 38.331 16.7.0 NR\_DSS\_enh

[R2-2201040](http://www.3gpp.org/ftp//tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs//R2-2201040.zip) RAN2 impact in DSS WI Ericsson discussion NR\_DSS\_enh

[R2-2201396](http://www.3gpp.org/ftp//tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs//R2-2201396.zip) Discussion on Cross-Carrier Scheduling from sSCell to P(S)Cell vivo discussion NR\_DSS\_enh

[R2-2201618](http://www.3gpp.org/ftp//tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs//R2-2201618.zip) Remaining issues on cross-carrier scheduling from SCell to P(S)Cell Huawei, HiSilicon discussion Rel-17 NR\_DSS-Core

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# 2 Discussion

## 2.1 RRC

### 2.1.1 Issue 1, one or two IEs

[R2-2201039](http://www.3gpp.org/ftp//tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs//R2-2201039.zip) RRC running CR for DSS Ericsson draftCR Rel-16 38.331 16.7.0 NR\_DSS\_enh

[R2-2201040](http://www.3gpp.org/ftp//tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs//R2-2201040.zip) RAN2 impact in DSS WI Ericsson discussion NR\_DSS\_enh

[R2-2201396](http://www.3gpp.org/ftp//tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs//R2-2201396.zip) Discussion on Cross-Carrier Scheduling from sSCell to P(S)Cell vivo discussion NR\_DSS\_enh

[R2-2201618](http://www.3gpp.org/ftp//tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs//R2-2201618.zip) Remaining issues on cross-carrier scheduling from SCell to P(S)Cell Huawei, HiSilicon discussion Rel-17 NR\_DSS-Core

RRC running CR was discussed in the last meeting [1] but no conclusion was made. The open issue was on whether the presence of the CIF is configurable. All submitted papers have acknowledged the latest RAN1 agreements. Note the SCell configured with cross-carrier scheduling to SpCell is referred to as ‘sSCell’.

|  |
| --- |
| Agreement  Confirm the WA from RAN1#106bis-e with addition of below Note (shown in blue)  *Working Assumption*   * *When CIF for sSCell to Pcell cross-carrier scheduling is configured, non-fallback DCI formats on P(S)Cell include same number of CIF bits as the corresponding non-fallback DCI formats on sSCell that are used for sSCell to P(S)Cell scheduling* * Note: per RAN1#102-e agreement, when sSCell to P(S)Cell scheduling is configured for the UE, cross-carrier scheduling from P(S)Cell to another cell is not allowed. The CIF bits included in non-fallback DCI formats on P(S)Cell are considered reserved. |

In other words, when CIF for SCell to SpCell cross-carrier scheduling is configured, the CIF bits are also present in DCI sent on the PDCCH on the SpCell, i.e., there is no need nor possibility to configure the presence of these CIF bits explicitly.

Per the above agreements, [R2-2201039](http://www.3gpp.org/ftp//tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs//R2-2201039.zip) and [R2-2201396](http://www.3gpp.org/ftp//tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs//R2-2201396.zip) propose to adopt the below option to capture the RRC spec. Note that in the last email discussion [1] all companies have replied that this option works.

**Alternative 1: SCell scheduling SpCell is configured by configuring the field ‘*schedulingCellInfo*’ in *CrossCarrierSchedulingConfig* for SpCell as ‘*other*’**

[R2-2201618](http://www.3gpp.org/ftp//tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs//R2-2201618.zip) proposes to introduce a new IE which would introduce additional RRC signalling overhead. The argument is for good readability.

**Alternative 2: Introduce a new IE to configure SCell scheduling SpCell.**

**Q1. Which one of the above alternatives does the company support?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Alt 1 or Alt 2 ?** | **Comments** |
| Ericsson | Alt 1 | We agree with the description in the R2-2201618 from Huawei that some further clarfications are needed, which can be discussed in the RRC running CR discussion. These apply for both alt 1 and alt 2.  We prefer the alt 1, because we don’t consider readability as an issue and also the below concerns for the alt 2:   1. In the legacy IE, one code point of the RRC configuration is not supported, i.e., *other* for SpCell in the legacy IE. For the alt 1, it is not changing the legacy signalling, but rather enabling the configuration in Rel-17 which was “artificially” disabled in Rel-15/Rel-16. This would of course come with field description update. Adding a new IE as in alt2 would work, but it does not seem to be necessary and it also introduces RRC signalling overhead. 2. Alt 2 has more impacts on the ASN.1 coding. One example is the below discussion on *enableDefaultBeamForCCS* and *carrierIndicatorSize*. These new fields may or may not be in the new IE, depending on the discussion which may further require RAN1 input. It is our preference to have a stable/workable RRC running CR and, if needed, make small corrections like a field description change in Alt1. 3. Alt 2 does not consider extensibility. If there are further generic enhancements for cross carrier scheduling, then one needs to add field in both the legacy IE and the new IE. |
| Huawei, HiSilicon | Alt 2 | We understand Alt 1 and Alt 2 are a matter of different tastes. From our understanding, we prefer Alt 2 over Alt 1 for better readability of a new feature, rather than mixing the feature with the legacy one. Some responses as shown below,  1. The changes of Alt 1 is not simply extending the values, but to give a different interpretation of the legacy IE with significant changes in the field descriptions. We don’t think it is the ususal way we treat a new feature in ASN.1. Adding a new IE should be the most clean approach and we don’t think it is an issue for RRC signalling overhead given that it is applicable only for DSS CCS capable UE. On the contrary, Alt 2 is more compatible to legacy CCS.  2. Difficult to say which one has more ASN.1 impacts. As we mentioned in our contributions, the parent IE with Alt 1 should be also updated. And the legacy IEs is not relevant to alternatives, see more comments to Q4.  3. We are not convinced by the comments of extensibility. Further enhancements should be common to Alt 1 and Alt 2. On the contrary, we believe Alt 2-like apporach is more future proof, without twisting all the features in the field description.  In a summary, Alt 1 would cause more difficult in readablity and not compatible (actually too “artificial“) with the legacy since we have to change the legacy description everywhere when applicable, thus Alt 2 is more desirable. |
| LGE | Alt 1 | Reusing the exiting IE seems sufficient while updating the field description is of course a necessary job. |
| ZTE | Alt 1 | We also think reusing the existing IE with some updates in the field description is enough. No need to introduce additional IE. |
| Intel | Alt 1 | The exiting IE can be reused. |

### 2.1.2 Issue 2, carrierIndicatorSize

[R2-2201618](http://www.3gpp.org/ftp//tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs//R2-2201618.zip) Remaining issues on cross-carrier scheduling from SCell to P(S)Cell Huawei, HiSilicon discussion Rel-17 NR\_DSS-Core

There are two legacy fields in the IE *CrossCarrierSchedulingConfig*. The paper [R2-2201618](http://www.3gpp.org/ftp//tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs//R2-2201618.zip) proposes to discuss how the below field can be configured in light of the Rel-17 DSS feature.

*carrierIndicatorSize-r16*

According to the conditional presence, *carrierIndicatorSize* is configured only in the scheduling cell in the legacy. The paper R2-2201618 proposes that this can be extended to the Rel-17, i.e., configured only in the scheduling SCell for the SpCell but not in the SpCell.

It is rapporteur’s understanding from the RAN1 agreement that when SCell schedules SpCell, non-fallback DCI formats on SpCell includes the same number of CIF bits as the scheduling SCell. There is no need to configure this field in the SpCell (i.e., the scheduled cell), as in the legacy Rel-16.

**Q2. Do companies agree that *carrierIndicatorSize-r16* is configured only in the scheduling SCell for the SpCell but not in the SpCell?**

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| --- | --- | --- |
| **Company** | **Yes or No ?** | **Comments** |
| Ericsson | Yes |  |
| Huawei, HiSilicon | Yes | Proponent |
| LGE | Yes |  |
| ZTE | Yes |  |
| Intel | Yes |  |

### 2.1.3 Issue 3, *enableDefaultBeamForCCS*

[R2-2201618](http://www.3gpp.org/ftp//tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs//R2-2201618.zip) Remaining issues on cross-carrier scheduling from SCell to P(S)Cell Huawei, HiSilicon discussion Rel-17 NR\_DSS-Core

There are two legacy fields in the IE *CrossCarrierSchedulingConfig*. The paper [R2-2201618](http://www.3gpp.org/ftp//tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs//R2-2201618.zip) proposes to discuss how the below field can be configured in light of the Rel-17 DSS feature.

*enableDefaultBeamForCCS-r16*

There is no configuration restriction in the Rel-16 RRC spec for this field. The understanding is that they can be configured in both scheduling cell and scheduled cell. The paper [R2-2201618](http://www.3gpp.org/ftp//tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs//R2-2201618.zip) proposes that RAN1 should discuss and give a confirmation on if this field is configurable or not.

It is rapporteur’s understanding that *enableDefaultBeamForCCS* is introduced in the LTE\_NR\_DC\_CA-enhCore WI in Rel-16, see RAN1 RRC parameter list [R1-2003190](http://www.3gpp.org/ftp//tsg_ran/WG1_RL1/TSGR1_100b_e/Docs//R1-2003190.zip), line 14 of tab NRDCCA. The RRC parameter list indicates that this is applicable to a cross-carrier scheduled SCell only and used for cross carrier scheduling with different SCS. This is also a per-UE parameter. It is to the best of rapporteur’s knowledge that this was not discussed in the Rel-17 enhanced DSS WI.

**Q3. What are companies’ view for the field *enableDefaultBeamForCCS*, if SCell scheduling SpCell is configured?**

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| --- | --- | --- |
| **Company** | **Views** | **Comments** |
| Ericsson | No need to clarify in RRC now | In the Rel-17 discussion, RAN1 did not identify any change compared to the Rel-16. The best way forward, in our view, is to leave this part unchanged. If we adopt Alt1 in Q1, then this can be easily done. However, if we adopt Alt2 in Q1, then one needs to discuss if this field can be in the new IE, which we don’t prefer.  One can argue that the Rel-16 RRC spec is not clear regarding the configuration restriction. It is our understanding that the configuration restriction could have been written in the RAN1 specs. If not, it is RAN1’s task to correct it and should also be in Rel-16 maintenance work not in a Rel-17 WI. By the similar argument, if there were any Rel-17 DSS enhancement regarding this field, such would be captured in the RAN1 specs or be indicated clearly in the RRC parameter list. |
| Huawei, HiSilicon | Okay with an EN and can be further updated | As we stated in our contribution, this issue is not relevant to which alternative to capture in Q1. Actually if it is confirmed that this IE is not applicable for DSS CCS, we think it would be cleaner for Alt 2 in Q1 by excluding this IE from the new CCS IE.  We agree that it was not even discussed in R16, but we also think it would good to clarify in R17. Otherwise the current RRC spec remains unclear, even worse than R16 given that DSS CCS is introduced. We would think it is better to put an EN to this IE and RAN1 can further update this by tracking RAN2’s discussions. Note that for cross-WI ASN.1 issues, RAN2 may have better view of handling this. |
| LGE | No change needed for now | We can keep this part unchanged unless further input from RAN1 is received. |
| ZTE | No change needed for now | Agree with LGE. |
| Intel | No change needed for now | Any further change could be triggered by RAN1. |

### 2.1.4 Issue 4, Monitoring capability

[R2-2201396](http://www.3gpp.org/ftp//tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs//R2-2201396.zip) Discussion on Cross-Carrier Scheduling from sSCell to P(S)Cell vivo discussion NR\_DSS\_enh

The paper proposes to capture the below RAN1 agreement in the RRC spec.

|  |
| --- |
| Agreement  • Alt1: When CCS from sSCell to P(S)Cell is configured for the UE,  o r16monitoringcapability is not configured for PDCCH monitoring on P(S)Cell and not configured for PDCCH monitoring on sSCell;  o r16monitoringcapability can be configured for PDCCH monitoring on Scells other than sSCell |

Per the rapporteur’s understanding, the *r16monitoringcapability* configuration restriction is already captured in the RAN1 spec, see clause 10.1.1, TS 38.213 v17.0.0.

|  |
| --- |
| A UE can be configured for scheduling on the primary cell from the primary cell and from a secondary cell [12, TS 38.331]. The UE is either not provided *monitoringCapabilityConfig* or the UE is provided only *monitoringCapabilityConfig* = *r15monitoringcapability* for the primary cell and for the secondary cell. The UE is not provided *coresetPoolIndex* on the primary cell or on the secondary cell. |

**Q4. Do companies agree to capture *r16monitoringcapability* restriction in the RRC spec?**

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| --- | --- | --- |
| **Company** | **Yes or No ?** | **Comments** |
| Ericsson | No | We prefer capturing this agreement only in one spec. Since RAN1 has done so, there is no need to do it in the RRC spec. |
| Huawei, HiSilicon | No | Agree with Ericsson |
| LGE | No | As in the legacy, it should be in 213 specification. |
| ZTE | No | Agree with Ericsson. |
| Intel | No | Agree with Ericsson |

### 2.1.5 Issue 5, search space linkage

[R2-2201396](http://www.3gpp.org/ftp//tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs//R2-2201396.zip) Discussion on Cross-Carrier Scheduling from sSCell to P(S)Cell vivo discussion NR\_DSS\_enh

The paper proposes to discuss how to capture the search space linkage for the Rel-17 DSS. Per rapporteur’s understanding, this has been discussed in the discussion point 13 in the [R1-2112884](http://www.3gpp.org/ftp//tsg_ran/WG1_RL1/TSGR1_107-e/Docs//R1-2112884.zip), the email summary from the RAN1#107e. It is in general not preferred to have parallel discussions in two different groups. Before summarizing and discussing the technical details, it is proposed to collect views on the need to discuss this in RAN2.

**Q5. Do companies agree to discuss search space linkage in RAN2?**

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| --- | --- | --- |
| **Company** | **Yes or No ?** | **Comments** |
| Ericssson | No | In general, we don’t prefer parallel discussions in two working groups. RAN2 invovlement in this topic would be useful only if RAN2 can provide additional inputs on top of the RAN1 discussion. We don’t believe this is the case here. Additionally, in the R1-2112884, the views from various RAN1 companies are split and we believe it is not fruitful to start this type of discussions in RAN2. |
| Huawei, HiSilicon | No | Agree with Ericsson |
| LGE | No | RAN1 is already discussing this issue. |
| ZTE | No | Agree with Ericsson. |
| Intel | No | No need to have parallel discussion with RAN1 |

## 2.2 MAC

[R2-2200294](http://www.3gpp.org/ftp//tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs//R2-2200294.zip) DSS and RA Procedure Samsung Electronics Co., Ltd discussion Rel-17 LTE\_NR\_DC\_enh2

[R2-2201040](http://www.3gpp.org/ftp//tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs//R2-2201040.zip) RAN2 impact in DSS WI Ericsson discussion NR\_DSS\_enh

[R2-2201618](http://www.3gpp.org/ftp//tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs//R2-2201618.zip) Remaining issues on cross-carrier scheduling from SCell to P(S)Cell Huawei, HiSilicon discussion Rel-17 NR\_DSS-Core

Neither [R2-2201040](http://www.3gpp.org/ftp//tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs//R2-2201040.zip) nor [R2-2201618](http://www.3gpp.org/ftp//tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs//R2-2201618.zip) proposes any spec enhancements, e.g., leaving to network implementation, re-using the legacy procedure, or waiting for RAN1 inputs, and etc. Only the paper [R2-2200294](http://www.3gpp.org/ftp//tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs//R2-2200294.zip) has proposed an enhancement for RA procedure.

[R2-2200294](http://www.3gpp.org/ftp//tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs//R2-2200294.zip): In legacy, contention resolution is received on the SpCell. In the case of DSS, PDCCH for contention resolution can be received via SCell. So, the paper proposes to consider in the contention resolution also a PDCCH transmission for the SpCell.

**Q6. Do companies agree that reception of a PDCCH for the SpCell from the scheduling SCell is considered for contention resolution in the MAC procedure?**

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| --- | --- | --- |
| **Company** | **Yes or No ?** | **Comments** |
| Ericsson | No | We understand the proposal may increase flexiblity (assuming no other bugs are introduced), but we are not convinced that the change itself is strictly needed.   1. For type-B UE, there is no issue at all since type-B UE can monitor user-specfic search space (USS) for SpCell on SpCell and for SpCell on SCell simultaneously; for type-A UE, it can only monitor USS at a given time (TDM between USS), but still no big issue. 2. The question is what if USS is configured only on the scheduling Scell. But we understand whether this is configurable is not determined yet in Ran1. In the worst case, the Common Search Space (CSS) is still available on SpCell. PDCCH with C-RNTI (which carries contention resolution) can be transmitted on the CSS of the SpCell. |
| Huawei, HiSilicon | No | There may some risk that the UE may mistake the normal CCS from SCell as contention resolution. For instance, for CB-BFR on PCell, given that the UE still monitors the PDCCH on the sSCell, thus in case even Msg3 transmission fails, normal CCS from SCell for PCell is still applicable, then the PDCCH for PCell from sSCell cannot be considered as contention resolution for BFR on PCell. Therefore, we believe that the legacy contention resolution is the only way to go by restricting PDCCH reception is on PCell. |
| LGE | No | The UE can still receive PDCCH on SpCell even when cross-carrier scheduled by sSCell. So, there is no issue to keep the legacy way of contention resolution as it is. |
| ZTE | No | Share the same view with Huawei. |
| Intel | No | Not necessary to make this change, as the Common Search Space (CSS) is still available on SpCell. |

## 2.3 Any Other Issues

**Q7. Any other issues?**

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| **Company** | **Issue and Comments** |
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# 3 Conclusion

TBD

# 4 References

1. [R2-2111459](http://www.3gpp.org/ftp//tsg_ran/WG2_RL2/TSGR2_116-e/Docs//R2-2111459.zip), Summary of [AT116-e][026][NR17] DSS (Ericsson), Ericsson
2. [R2-2110730](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2110730.zip) , RRC running CR for DSS, Ericsson