**3GPP TSG RAN WG1 #102-e R1-20xxxxx**

**e-Meeting, August 17th – 28th, 2020**

**Agenda Item:** **7.2.3**

**Source: Moderator (AT&T)**

**Title: Feature Lead Summary of 7.2.3 Maintenance of Integrated Access and Backhaul for NR**

**Document for:** **Discussion/Approval**

# Introduction

This contribution provides a summary of 7.2.3 Maintenance of Integrated Access and Backhaul for NR.

# Remaining Rel-16 Maintenance Issues

## Starting slot within DCI 2\_5 indication

**Source**: R1-2005316

**Background:** The current TS 38.213 states the following:

*An AI index field value in a DCI format 2\_5 indicates to an IAB-node DU a soft symbol availability in each slot for a number of slots starting from a slot where the IAB-node detects the DCI format 2\_5.*

The specification text “from **a** slot” does not specifically mention whether the slot is defined based on the DU or MT resource configuration/timing and configured SCS for the AI index file value in DCI Format 2\_5. If the SCS is different for the IAB-DU and IAB-MT, different slots may be identified for that reference slot.

**FL Conclusion 2.1.1:** Discuss whether this is a critical issue and potential solution in RAN1#102-e.

**Discussion:**

|  |  |  |
| --- | --- | --- |
| **Company**  | **Do you agree with FL Conclusion 2.1.1?** | **Comments**  |
| ZTE, Sanechips | Agree | As shown in our contribution R1-2005316, regardless whether “a slot” mentioned above is understood as “DU slot” or “MT slot”, the 38.213 statement referred above has ambiguity issue.  |
| Ericsson | Agree | Although not necessarily critical in the sense that this will be a common problem, a clarification alike ZTE’s may be in place. |
| Nokia, NSB | Agree | We are fine to discuss this issue. As ZTE mentioned there could be different understanding.  |
| Huawei | Agree | Some clarification may be useful though we are not sure whether any change to the spec is required.  |
| Samsung | Agree | Fine to discuss the issue although we don’t think some spec change is needed. |
| LG | Agree | We are fine for discussing this issue. But, not sure whether any spec change is needed.  |
| Intel | Agree | We are fine to discuss and make clarification regarding this issue. |
| Qualcomm | Agree | We agree there is an ambiguity in the text which should be discussed and resolved. |
|  |  |  |
|  |  |  |
|  |  |  |

## Indication of soft resource availability in case of paired spectrum

**Source**: R1-2005316

**Background:** For paired spectrum, RAN1#100b-e reached the following agreement [1]:

|  |
| --- |
| Agreements For paired spectrum, the DU resource configuration framework is extended with the following:Two separate per-cell D/U/F and H/S/NA configurations are provided for DL and UL respectively.Whether this signalling is supported in Rel-16 is up to RAN3 and no additional specification impact is considered in RAN1 in Rel-16 for IAB operation in paired spectrum. |

RAN3[2] has accordingly provided the signaling related to D/U/F and H/S/NA configurations for DL and UL respectively in paired spectrum. The signaling are called “**gNB-DU Cell Resource Configuration-FDD-DL**” and “**gNB-DU Cell Resource Configuration-FDD-UL**”. Meanwhile, RAN3 also updated the signaling for unpaired spectrum to “**gNB-DU Cell Resource Configuration-TDD**”.

**FL Conclusion 2.2.1:** This issue can be addressed in a straightforward manner as the following suggested editorial updates to TS 38.213:

* *To rename the parameter “IAB-DU-Resource-Configuration-TDD-Config” in 38.213 to “gNB-DU Cell Resource Configuration-TDD”.*
* *To add following description in 38.213 for paired spectrum operation:*

*The IAB-DU can assume a same SCS configuration for availabilityCombinations for IAB-DU downlink of a serving cell as an SCS configuration provided by gNB-DU Cell Resource Configuration-FDD-DL for the serving cell, and a same SCS configuration for availabilityCombinations for IAB-DU uplink of a serving cell as an SCS configuration provided by gNB-DU Cell Resource Configuration-FDD-UL for the serving cell.*

**Discussion:**

|  |  |  |
| --- | --- | --- |
| **Company**  | **Do you agree with FL Conclusion 2.2.1?** | **Comments**  |
| ZTE, Sanechips | Agree to 1st bullet. The 2nd bullet may be dependent on conclusion of section 2.3.  | The 2nd bullet seems useless if RAN1 spec does nothing for what is mentioned in section 2.3. To avoid the RAN1 spec integrity issue that the SCS’s of availabilityCombinations for DU DL and DU UL are specified but the relative bitmaps are not, people may want to put 2nd bullet on hold if no solution is drawn from section 2.3 in this meeting.  |
| Ericsson | Agree | The assumption in the second bullet should be valid for the frequency ranges that comprise paired spectrum. |
| Nokia, NSB | Ok with the first bullet.  | First bullet seems to be an editorial correction. Second suggestion is not required as there is matching conclusion before. Agreements For paired spectrum, the DU resource configuration framework is extended with the following: Two separate per-cell D/U/F and H/S/NA configurations are provided for DL and UL respectively. Whether this signalling is supported in Rel-16 is up to RAN3 and no additional specification impact is considered in RAN1 in Rel-16 for IAB operation in paired spectrum.Agreements No additional specification impact for 38.213 is required for the definition of half-duplex operation in case of IAB nodes operating in paired spectrum. Further discussion of the default multiplexing capability indication for IAB nodes operating in paired spectrum can be discussed under the IAB-MT Features agenda item in the future (if needed). |
| Huawei | Fine with the RRC parameter name change  | Agree with Nokia though it is a bit unfortunate for FDD.  |
| Samsung | Agree | It may be up to 213 editor. |
| LG | Agree | Fine with first bullet. Regarding second bullet, we agree with Nokia. |
| Intel | Ok with the first bullet | Regarding second bullet, check our comments in section 2.3.1. |

**FL Conclusion 2.2.2:** Discuss in RAN1#102-e the minimum specification effort for adding following RAN3-defined signaling parameters to TS 38.213:

* *Rename the parameter “IAB-DU-Resource-Configuration-TDD-Config” in 38.213 to “gNB-DU Cell Resource Configuration-TDD”.*
* *For paired spectrum operation:*

*gNB-DU Cell Resource Configuration-FDD-DL and gNB-DU Cell Resource Configuration-FDD-UL*

Note: the intention is to not go beyond the RAN1#100b-e agreement:

Agreements For paired spectrum, the DU resource configuration framework is extended with the following:

Two separate per-cell D/U/F and H/S/NA configurations are provided for DL and UL respectively.

Whether this ignaling is supported in Rel-16 is up to RAN3 and no additional specification impact is considered in RAN1 in Rel-16 for IAB operation in paired spectrum.

**Discussion:**

|  |  |  |
| --- | --- | --- |
| **Company**  | **Do you agree with FL Conclusion 2.2.2?** | **Comments**  |
| Huawei  | Agree |  |
| Samsung | Agree |  |
| LG | Agree |  |
| Intel | Agree |  |
| Qualcomm | Agree | None |

## Indication of soft resource availability in case of paired spectrum

**Source**: R1-2005316

**Background:** The current TS 38.213 also does not show how to determine the availability of soft resources for paired spectrum by DCI format 2\_5. DCI format 2\_5 structure is similar as DCI format 2\_0 for a UE in Section 11 of TS 38.213 except that soft resources availability for an IAB-DU can be indicated by DCI format 2\_5 and slot formats for a UE can be indicated by DCI format 2\_0. Consequently, there can be two alternatives:

* Alt1: to apply a similar way as in slot format determination with DCI format 2\_0 to paired spectrum, i.e., for each  values provided by *resource*Availability, the first  values for the soft symbol availability combination is applicable to DL carrier and the next  values are applicable to the UL carrier.
* Alt2: to add a parameter *resource*Availability\_UL in TS38.213 for indicating resource availability for uplink of an IAB-DU serving cell and to reuse the resource availability indication signaling of unpaired spectrum for downlink of paired spectrum.

**FL Conclusion 2.3.1:** Given the agreement in RAN1#100b-e, it is not possible to consider either Alt. 1 or Alt. 2 as a maintenance item in Rel-16:

Agreements For paired spectrum, the DU resource configuration framework is extended with the following:

Two separate per-cell D/U/F and H/S/NA configurations are provided for DL and UL respectively.

Whether this ignaling is supported in Rel-16 is up to RAN3 and no additional specification impact is considered in RAN1 in Rel-16 for IAB operation in paired spectrum.

**Discussion:**

|  |  |  |
| --- | --- | --- |
| **Company**  | **Do you agree with FL Conclusion 2.3.1?** | **Comments**  |
| ZTE, Sanechips | Not sure. | We admit and respect the earlier RAN1 agreement. But the consequence seen today seems the blackout of DCI 2\_5 from paired spectrum, which is supposed to be unexpected when making that RAN1 #100b-e agreement. Given there would be RAN2 discussion as well for the same issue, RAN1 can wait for RAN2 outcome. Whether RAN2 picks Alt1, Alt2 or defining nothing, the remaining task for RAN1 seems all straightforward. So if the majority companies are not ready to discuss the RAN1 spec impact which was earlier believed as none, our alternative proposal is: *To maintain RAN1 #100b-e agreement for now and meanwhile* *to wait for RAN2 conclusion (if any) for the resource availability indication by DCI 2\_5 in case of paired spectrum.*  |
| Ericsson | Agree |  |
| Nokia, NSB | Agree with FL | We should not open new discussions on this now in Rel-16 when there is a clear agreement before on paired spectrum.  |
| Huawei | Agree |  |
| Samsung | Agree |  |
| LG | Agree |  |
| Intel | Agree with FL | If we need to discuss this issue, Alt.1 or Alt. 2 is not enough. We need to further add descriptions on the scenario that DCI 2\_5 is transmitted to multiple IAB and each DU has different SCS assumption with its own configuration. In last meeting, we have proposed to discuss the details of this issue with two solutions: 1. Add reference SCSs for soft resource availability indication
2. In case DCI Format 2\_5 is transmitted to multiple IAB nodes in the CSS, it is expected that the same reference SCS is applied by all IAB-DUs.

However, they are not agreed and no detailed descriptions/ specification impact in Rel-16 for IAB operation in paired spectrum is considered. Hence, we agree with FL conclusion for this stage in Rel-16 not to consider this item. But we can bring this discussion to Rel-17 IAB.  |
| Qualcomm | Agree | We actually think that the current specification does provide a way to determine the availability of soft resources for paired spectrum. |

## PDCCH monitoring in IAB

**Source**: R1-2006377

**Background:** To indicate resource availability information for DU soft resource, DCI format 2\_5 is introduced in Rel-16 IAB. An IAB-MT monitors PDCCH with DCI format 2\_5 in CSS and/or USS, where CRC for DCI format 2\_5 is scrambled by AI-RNTI.

However, in the current specification on TS 38.213, search space sets for monitoring DCI format with CRC scrambled by an AI-RNTI is not specified. As provided in Proposal 1, it should be added that for a DCI format with CRC scrambled by an AI-RNTI, an IAB-MT monitors PDCCH candidates in a Type3-PDCCH CSS set and a USS set.

**FL Conclusion 2.4.1:** This issue can be addressed in a straightforward manner as a suggested editorial update to TS 38.213:

-------------------------------------------------------- Omitted -----------------------------------------------------

10.1   UE procedure for determining physical downlink control channel assignment

A set of PDCCH candidates for a UE to monitor is defined in terms of PDCCH search space sets. A search space set can be a CSS set or a USS set. A UE monitors PDCCH candidates in one or more of the following search spaces sets

-     a Type0-PDCCH CSS set configured by *pdcch-ConfigSIB1* in *MIB* or by *searchSpaceSIB1* in *PDCCH-ConfigCommon* or by *searchSpaceZero* in *PDCCH-ConfigCommon* for a DCI format with CRC scrambled by a SI-RNTI on the primary cell of the MCG

-     a Type0A-PDCCH CSS set configured by *searchSpaceOtherSystemInformation* in *PDCCH-ConfigCommon* for a DCI format with CRC scrambled by a SI-RNTI on the primary cell of the MCG

-     a Type1-PDCCH CSS set configured by *ra-SearchSpace* in *PDCCH-ConfigCommon* for a DCI format with CRC scrambled by a RA-RNTI, a MsgB-RNTI, or a TC-RNTI on the primary cell

-     a Type2-PDCCH CSS set configured by *pagingSearchSpace* in *PDCCH-ConfigCommon* for a DCI format with CRC scrambled by a P-RNTI on the primary cell of the MCG

-     a Type3-PDCCH CSS set configured by *SearchSpace* in *PDCCH-Config* with *searchSpaceType* = *common* for DCI formats with CRC scrambled by INT-RNTI, SFI-RNTI, TPC-PUSCH-RNTI, TPC-PUCCH-RNTI, TPC-SRS-RNTI, CI-RNTI, PS-RNTI, or AI-RNTI and, only for the primary cell, C-RNTI, MCS-C-RNTI, or CS-RNTI(s), and

-     a USS set configured by *SearchSpace* in *PDCCH-Config* with *searchSpaceType* = *ue-Specific* for DCI formats with CRC scrambled by C-RNTI, MCS-C-RNTI, SP-CSI-RNTI, CS-RNTI(s), SL-RNTI, SL-CS-RNTI, SL-L-CS-RNTI, or AI-RNTI.

-------------------------------------------------------- Omitted -----------------------------------------------------

**Discussion:**

|  |  |  |
| --- | --- | --- |
| **Company**  | **Do you agree with FL Conclusion 2.4.1?** | **Comments**  |
| ZTE, Sanechips | Agree |  |
| Ericsson | Agree |  |
| Nokia, NSB | Agree | No comments. Editorial correction.  |
| Huawei | Partially | Though the search space for DCI format 2\_5 has not been captured in 38.213 but it may not be proper to add it in section 10 since this can be apply UEs. It may be better to capture something in section 14 for IAB-MT only.  |
| Samsung | Agree | None |
| LG | Agree |  |
| Intel | Agree |  |
| Qualcomm | Agree | None |
|  |  |  |
|  |  |  |
|  |  |  |

# Summary

TBD