**3GPP TSG-RAN3 #108-e R3-204065**

1st June – 12th June 2020

Online

Agenda Item: 09.3.8.1

Source: Ericsson

Title: SoD for Overlapping bands handling

Document for: Discussion, Decision

# Introduction

This is a summary of offline discussions for the topic of overlapping bands management. Specifically, we are interested in the case that the Ue is served by a cell with overlapping bands and where gNB-DU may need to apply to a UE different bands per cell than the ones selected by UE. The issue is how the gNB-CU can be informed of such decision.

**CB: # 89\_OverlappingBandsHandling**

**- is issue acknowledged?**

**- check scenario**

(E/// - moderator)

Summary of offline disc [R3-204065](file:///D:\\Yang%20Xudong\\3GPP%20meetings\\RAN3-108\\CB\\CB%20%23%2089_OverlappingBandsHandling\\Inbox\\R3-204065.zip)

## Summary of offline discussions

The following scenario was presented:

*A cell supports overlapping bands and multiple frequency bands are broadcast in SIB1. When the UE tries to access a cell, it selects the first band in the frequencyBandList broadcast in SIB1 that it supports, according to supportedBandListNR reported in UE-NR-Capability (see TS38.331).*

*A gNB-DU may decide to serve the UE on a different band than the one initially selected by the UE. This decision is possible by signalling from gNB-DU to gNB-CU of a CellGroupConfig including a new FreqBandIndicatorNR* IE for the UE.

*The problem identified is that the gNB-DU should indicate a new band selection for the UE to the gNB-CU in order to allow the gNB-CU to have a proper mapping of measurement objects and frequency bands to which the measurement object is associated.*

Companies position:

* Two companies acknowledge the scenario and issue
* Two companies do not acknowledge the scenario

During offline discussions it emerged that the scenario was not equally understood by all companies, with some companies believing that the band selection performed by the gNB-DU implies a change of cell. It was clarified that the change of band is made within the same cell.

# For the Chairman’s Notes

Following agreements were proposed on the first round of offline discussion:

It is proposed to acknowledge the scenario and the issue, which is described as follows:

*In a cell that supports multiple overlapping bands,* *a gNB-DU may decide to serve the UE on a different band than the one initially selected by the UE. This decision is possible by signalling from gNB-DU to gNB-CU of a CellGroupConfig including a new FreqBandIndicatorNR* IE for the UE.

*The problem identified is that the gNB-DU should indicate a new band selection for the UE to the gNB-CU in order to allow the gNB-CU to have a proper mapping of measurement objects and frequency bands to which the measurement object is associated.*

It is proposed to continue discussions on how to resolve this issue.

# Discussion

## Acknowledgement of the issue

To support overlapping bands, multiple frequency bands are broadcast in SIB1. When the UE tries to access a cell, it selects the first band in the *frequencyBandList* broadcast in SIB1 that it supports, according to supportedBandListNR reported in UE-NR-Capability.

The scenario here is where the gNB-DU decides to serve the UE on a different band than the one initially selected by the UE. In the scenario where the same cell supports overlapping bands, it is possible that the gNB-DU decides to serve the UE on a band that was not the same originally selected by the UE (but that overlaps the originally selected band). The gNB-DU should indicate such band selection to the gNB-CU in order to allow the gNB-CU to have a proper mapping of measurement objects and frequency bands to which the measurement object is associated.

Companies are invited to provide their views on whether the issue described above and in [1] is acknowledged.

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| Company | ACK/NACK | Comments |
| Ericsson | ACK | The issue exists and if nothing is done we have a non interoperable system where the gNB-CU may signal configuration of measurements (i.e. assignment of measurement objects) for a given cell/frequency/band, when the UE is served on a different band. The measurements configured by the gNB-CU might therefore be wrongly configured as they are meant for a different band |
| Huawei | NACK | Not sure if there are any issue here.  Taking both 38.331 and 38.473 into account, FreqBandIndicatorNR is sent from CU to DU, we don't understand why DU needs to change the band indicator, and different band indicator may point to the same frequency band. And we already allow DU to decide the cells to be served for a UE among given candidate cells.  In general, we don't see any issues here. |
| Nokia | NACK | Issue is unclear, and proposal seen as an enhancement only.  In our understanding the proposed change in behaviour conflicts with previously agreed existing framework and it is not acknowledged that DU would be allowed to change measurement object as proposed.  Likewise, in our view, a similar discussion also took place in past when discussing whether DU should be allowed to change the PCell/SCell, and which after much discussion ended up with agreement that CU provides a proposal, and DU either accepts or rejects, but does not change the Pcell/Scell on its own.  The discussion of whether DU would be allowed to autonomously change the band selection is directly linked also to framework on whether a DU is allowed to select a PCell/SCell different to what the CU has indicated, and for which the discussion would need to be reopened on this regard. Likewise, such changes would not be subject to being a correction in Rel 15, but rather an enhancement that could be discussed covering both aspects (band selection AND PCell/Scell selection) in a future release. |
| ZTE | ACK | It seems that the issue exists in CA scenario, i.e., the band the UE served can be different with the band configured originally for the UE. However, as the gNB-DU can select the band combination in current specification, the solution to address this issue can be easier to reuse the existing IE. |

## Possible Solutions

It was discussed in [1] that a number of solutions to the issue described in section 3.1 are possible.

The solution suggested in [1] is to allow the gNB-DU to signal, for each SpCell or SCell serving the UE, a FreqBandIndicatorNR IE, which is defined in TS38.331. In this way the gNB-CU knows the band selected by the gNB-DU for the UE.

The gNB-CU could then associate the Measurement Object allocated to the SpCell/SCell with the band on which the UE is served for that cell.

During online discussions it was proposed that the gNB-DU could inform the gNB-CU of the band selected for the UE by means of the Selected *BandCombinationIndex* IE. The Selected *BandCombinationIndex* IE consists of the RRC *BandCombinationIndex* IE, which is defined as follwos in TS38.331:

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| ***BandCombinationInfoSN* field descriptions** |
| ***bandCombinationIndex***  In case of (NG)EN-DC and NR-DC, this field indicates the position of a band combination in the *supportedBandCombinationList*. In case of NE-DC, this field indicates the position of a band combination in the *supportedBandCombinationList* and/or *supportedBandCombinationListNEDC-Only*. Band combination entries in *supportedBandCombinationList* are referred by an index which corresponds to the position of a band combination in the *supportedBandCombinationList*. Band combination entries in *supportedBandCombinationListNEDC-Only* are referred by an index which corresponds to the position of a band combination in the *supportedBandCombinationListNEDC-Only* increased by the number of entries in *supportedBandCombinationList*. |
| ***requestedFeatureSets***  The position in the *FeatureSetCombination* which identifies one *FeatureSetUplink*/*Downlink* for each band entry in the associated band combination |

From the above description it appears that the RRC BandCombinationIndex IE is not the correct IE to indicate band selection in an SpCell or SCell, as it is tightly connected to the DC scenarios.

Companies are invited to provide their opinion on solutions based on indication from gNB-DU to gNB-CU of the selected band for the UE for an SpCell and/or an SCell

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| Company | Comments |
| Ericsson | Informing the gNB-CU of the band selected for the UE is essential as otherwise gNB-DU and gNB-CU are out of synch with respect to the band on which the UE is served. Supporting a solution that minimises the impact on the system is preferable. For example, by reusing the Measurement Objects already assigned by the gNB-CU for a specific cell and re-mapping those Measurement Objects to the new band selected by the gNB-DU |
| ZTE | Reusing the *Selected BandCombinationIndex* in *DU to CU RRC Information* could be a more appropriate solution to this issue. In current specification, the *Selected BandCombinationIndex* is only used for DC cases, in order to address this issue, this IE can be extended to support CA cases. |

# Conclusion, Recommendations [if needed]

If needed

# References

[1] R3-203380, Overlapping bands handling (Ericsson)

[2] R3-203381, Overlapping band handling CR 38.473 (Ericsson)