**3GPP TSG-RAN WG4 Meeting #107R4-230xxxx**

**Incheon, KR, 22th – 26th May, 2023**

**Agenda item:** 8.12.4

**Source:** Moderator (Huawei)

**Title:** Topic summary for [107][214] NonCol\_intraB\_ENDC\_NR\_CA

**Document for:** Information

# Introduction

This document is the RRM discussion summary for support of intra-band non-collocated EN-DC/NR-CA deployment (AI 8.12.3), including the following topics:

* Topic #1: FR1 non-collocated EN-DC/NR-CA for Type 2 UE for 2 layer MIMO case
* Topic #2: FR1 non-collocated EN-DC/NR-CA for ”New Type UE” for 4 layer MIMO case

# Topic #1: FR1 non-collocated EN-DC/NR-CA for Type 2 UE for 2 layer MIMO case

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| [R4-2307891](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_107/Docs/R4-2307891.zip) | MediaTek inc. | Proposal 1: For an unknown FR1 intra-band non-collocated SCell, provided that the side condition Ês/Iot ≥ -2dB is fulfilled, Tactivation\_time is:   * **Tactivation\_time is TFirstSSB\_MAX + TSMTC\_MAX + 2\*Trs + 5ms, if one of the following conditions is met**   **- ‘ssb-PositionInBurst’ indicates only one SSB is being actually transmitted, or**  **- ‘ssb-PositionInBurst’ indicates multiple SSBs and TCI indication is provided in same MAC PDU with SCell activation,**   * **Otherwise Tactivation\_time is:**   + **6ms + TFirstSSB\_MAX + TSMTC\_MAX + Trs + TL1-RSRP,measure + TL1-RSRP,report + THARQ + max(Tuncertainty\_MAC + TFineTiming + 2ms, Tuncertainty\_SP), if semi-persistent CSI-RS is used for CSI reporting,**   + **3ms + TFirstSSB\_MAX + TSMTC\_MAX + Trs + TL1-RSRP,measure + TL1-RSRP,report + max(THARQ + Tuncertainty\_MAC + 5ms + TFineTiming, Tuncertainty\_RRC + TRRC\_delay), if periodic CSI-RS is used for CSI reporting.** |
| [R4-2308703](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_107/Docs/R4-2308703.zip) | Huawei, HiSilicon | ***Observation 1: In current spec, the values of TSMTC\_MAX and TFirstSSB\_MAX used for defining SCell activation delay requirements in FR1 are separately defined for intra-band case and inter-band case.***  ***Proposal 1: For Type 2 UE, the values of TSMTC\_MAX and TFirstSSB\_MAX used for defining SCell activation delay requirements for FR1 inter-band CA case can be reused for FR1 intra-band non-contiguous CA.*** |
| [R4-2308704](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_107/Docs/R4-2308704.zip) | Huawei, HiSilicon | DraftCR on SCell activation and BFD/CBD requirements for Type 2 UE |
| [R4-2309114](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_107/Docs/R4-2309114.zip) | Nokia, Nokia Shanghai Bell | **Observation #1:** RRM requirements including MRTD/MTTD were not in the scope of the legacy WIs where RF requirements for 2-layer inter-band EN-DC with overlapping DL bands were introduced.  **Observation #2:** Identifying the MRTD/MTTD and other RRM requirements impacts in non-collocated deployment is clearly indicated in R18 non-collocated intra-band NRCA/EN-DC WID.  **Proposal 1: The discussion on the MRTD/MTTD and other RRM requirements impact in R18 shall be within the R18 non-collocated intra-band NRCA/EN-DC WID.** |
| [R4-2309115](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_107/Docs/R4-2309115.zip) | Nokia, Nokia Shanghai Bell, Ericsson | CR on MRTD/MTTD requirement for non-collocated inter-band EN-DC with overlapping bands  (*similar CRs R4-2309117 and R4-2309118 are submitted for R16 and R17 in agenda 4.4)* |
| [R4-2309116](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_107/Docs/R4-2309116.zip) | Nokia, Nokia Shanghai Bell | CR on interruption requirement for FR1 inter-band EN-DC with overlapping DL bands  (*similar CRs R4-2309119 and R4-2309120 are submitted for R16 and R17 in agenda 4.4)* |
| [R4-2309318](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_107/Docs/R4-2309318.zip) | Samsung | **Observation 1: Based on existing agreements, no requirement impact is necessary on the clause to specify the value of SCell activation delay requirement.**  **Observation 2: No requirement impact is necessary on the applicability clause for SCell activation delay requirement.**  **Proposal 1: For FR1 intra-band NR-CA Type-2 UE, there is no requirement impact required for SCell activation delay requirement.**  **Proposal 2: The following text proposal on existing BFD/CBD requirement is adopted for introducing FR1 intra-band NR-CA Type-2 UE (by taking SSB-based BFD as example).**   |  | | --- | | 8.5.2 Requirements for SSB based beam failure detection8.5.2.1 Introduction The requirements in this clause apply for each SSB resource in the set  configured for a serving cell, provided that the SSB configured for beam failure detection is actually transmitted within the UE active DL BWP during the entire evaluation period specified in clause 8.5.2.2. For UE not supporting *[intraBandNRCA-NonCollocated-r18],* the~~The~~ requirements in this clause could not be applicable if UE is required to perform beam failure detection on more than 1 serving cell per band. For UE supporting *[intraBandNRCA-NonCollocated-r18]*, the requirements in this clause apply when UE is required to perform beam failure detection on no more than 2 serving cell per band if these 2 serving cells in non-contiguous carriers, and no more than 1 serving cell per band otherwise. | |
| [R4-2309319](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_107/Docs/R4-2309319.zip) | Samsung | Draft CR to TS38.133 on BFD/CBD Requirement for Rel-18 intra-band CA Type-2 UE |

## Open issues summary

*Before f2f meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic 1-1 General aspects

*Open issues and candidate options before f2f meeting:*

**Issue 1-1-1: RRM requirements for FR1 inter-band EN-DC with overlapping DL band**

* Proposals:
  + Proposal 1: (Nokia)
    - The discussion on the MRTD/MTTD and other RRM requirements impact in R18 shall be within the R18 non-collocated intra-band NRCA/EN-DC WID.

*Background: RAN4 has agreed that the impacts due to UE capability of interBandMRDC-WithOverlapDL-Bands-r16 shall be discussed in RRM maintenance part instead of in this WI.*

* Recommended WF
  + Continue discussion.

### Sub-topic 1-2 SCell activation requirements

*Open issues and candidate options before f2f meeting:*

**Issue 1-2-1: Impacts on SCell activation requirements**

* Proposals
  + Proposal 1: (MTK)
    - For an unknown FR1 intra-band non-collocated SCell, provided that the side condition Ês/Iot ≥ -2dB is fulfilled, Tactivation\_time is:
      * Tactivation\_time is TFirstSSB\_MAX + TSMTC\_MAX + 2\*Trs + 5ms, if one of the following conditions is met
        + ‘ssb-PositionInBurst’ indicates only one SSB is being actually transmitted, or
        + ‘ssb-PositionInBurst’ indicates multiple SSBs and TCI indication is provided in same MAC PDU with SCell activation,
      * Otherwise Tactivation\_time is:
        + 6ms + TFirstSSB\_MAX + TSMTC\_MAX + Trs + TL1-RSRP,measure + TL1-RSRP,report + THARQ + max(Tuncertainty\_MAC + TFineTiming + 2ms, Tuncertainty\_SP), if semi-persistent CSI-RS is used for CSI reporting,
        + 3ms + TFirstSSB\_MAX + TSMTC\_MAX + Trs + TL1-RSRP,measure + TL1-RSRP,report + max(THARQ + Tuncertainty\_MAC + 5ms + TFineTiming, Tuncertainty\_RRC + TRRC\_delay), if periodic CSI-RS is used for CSI reporting.
  + Proposal 2: (Huawei)
    - For Type 2 UE, the values of TSMTC\_MAX and TFirstSSB\_MAX used for defining SCell activation delay requirements for FR1 inter-band CA case can be reused for FR1 intra-band non-contiguous CA.
  + Proposal 3: (Samsung)
    - For FR1 intra-band NR-CA Type-2 UE, there is no requirement impact required for SCell activation delay requirement.

*Background: RAN4 has agreed that the existing SCell activation time* *for an FR1 SCell for non-contiguous intra-band CA can be re-used for Type 2 UE, and RAN4 needs to FFS whether any CRs are needed to clarify the requirements applicability.*

* Recommended WF
  + Discuss whether there is any impact on SCell activation delay requirements. Based on proposal 1 and proposal 3, no impact on SCell activation delay requirement is observed. Based on proposal 2, the impact on the definition of TSMTC\_MAX and TFirstSSB\_MAX used for defining SCell activation delay requirements is observed.

### Sub-topic 1-3 BFD/CBD requirement requirements

*Open issues and candidate options before f2f meeting:*

**Issue 1-3-1: Impacts on BFD/CBD requirement requirements**

* Proposals
  + Proposal 1: (Huawei)
    - The following text proposal on existing BFD/CBD requirement is proposed for Type 2 UE (by taking SSB-based BFD as example).

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| 8.5.2 Requirements for SSB based beam failure detection8.5.2.1 Introduction The requirements in this clause apply for each SSB resource in the set  configured for a serving cell, provided that the SSB configured for beam failure detection is actually transmitted within the UE active DL BWP during the entire evaluation period specified in clause 8.5.2.2. The requirements in this clause could not be applicable if UE is required to perform beam failure detection on more than 1 serving cell per band. When FR1 intra-band non-contiguous carrier aggregation in FR1 is configured, the requirements in this clause can be applicable if UE capable of [*intraBandNRCA-NonCollocated-r18*] is required to perform beam failure detection on up to two serving cells in the same band. |

* + Proposal 2: (Samsung)
    - The following text proposal on existing BFD/CBD requirement is adopted for introducing FR1 intra-band NR-CA Type-2 UE (by taking SSB-based BFD as example).

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| 8.5.2 Requirements for SSB based beam failure detection8.5.2.1 Introduction The requirements in this clause apply for each SSB resource in the set  configured for a serving cell, provided that the SSB configured for beam failure detection is actually transmitted within the UE active DL BWP during the entire evaluation period specified in clause 8.5.2.2. For UE not supporting *[intraBandNRCA-NonCollocated-r18],* the~~The~~ requirements in this clause could not be applicable if UE is required to perform beam failure detection on more than 1 serving cell per band. For UE supporting *[intraBandNRCA-NonCollocated-r18]*, the requirements in this clause apply when UE is required to perform beam failure detection on no more than 2 serving cell per band if these 2 serving cells in non-contiguous carriers, and no more than 1 serving cell per band otherwise. |

* Recommended WF
  + Discuss on the CRs directly.

# Topic #2: FR1 non-collocated EN-DC/NR-CA for New Type UE for 4 layer MIMO case

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [R4-2308703](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_107/Docs/R4-2308703.zip) | Huawei, HiSilicon | ***Proposal 2: For 4-layer MIMO, it is suggested to postpone the RRM discussions on both Type 3a/3b and Type 4a/4b.*** |

## Open issues summary

### Sub-topic 2-1 General requirements

*Open issues and candidate options before f2f meeting:*

**Issue 2-1-1: RRM discussion for New Type UE for 4 layer MIMO**

* Proposals
  + Proposal 1: (Huawei)
    - For 4-layer MIMO, it is suggested to postpone the RRM discussions on both Type 3a/3b and Type 4a/4b.
* Recommended WF
  + Continue discussion