**3GPP TSG-RAN WG4 Meeting #111 (Draft) R4-2408007**

**Fukuoka, Japan, 20 May 2024– 24 May 2024**

**Agenda item:** 7.7.4

**Source:** Moderator (Samsung)

**Title:** Topic summary for [111][210] NR\_HST\_FR2\_enh

**Document for:** Information

# Introduction

*Briefly introduce background, the scope of this email discussion (e.g. list of treated agenda items) and provide some guidelines for email discussion if necessary.*

In RAN#95e meeting, the Rel-18 RAN4-led work item on enhanced NR support for high speed train scenario in FR2 has been approved [RP-220985], which has been further updated in [RP-222272]. As big CR [R4-2319897] agreed in RAN4 #108, the relevant RRM core requirement for Rel-18 FR2 HST scenarios are introduced and enhanced over existing FR2 RRM requirements. In RAN4 #108-bis, the preliminary RRM performance requirements was discussed. A big CR [R4-2402556] capturing inter-frequency measurement requirements enhancement in Idle mode and SCell activation delay requirement enhancement for Deactivated SCell was agreed in RAN4 #110.

Specifically, the enhancements for Rel-18 FR2 HST core requirements are introduced on: Cell re-selection: inter-frequency measurement in idle mode; Maximum Receive Timing Difference; UE transmit timing: One shot large UL timing adjustment for FR2 Power Class 6 UE; Active TCI state switching delay; SSB based radio link monitoring (Minimum requirement); SSB based beam failure detection (Minimum requirement); SSB based L1-RSRP measurement (SSB based L1-RSRP Reporting); Intra-frequency measurement; Inter-frequency measurement; SCell Activation and Deactivation Delay

For performance part, the draft Big CR [R4-2403320] was firstly endorsed in RAN4 #110 to capture the corresponding enhanced performance requirements, and then in RAN4 #110-bis, an updated draft Big CR [R4-2406408] was endorsed.

This T-doc will be used to guide and summarize the email discussion for the topic of Rel-18 NR HST FR2 enhancements RRM performance requirements with the email thread identifier “[111][210] NR\_HST\_FR2\_enh”.

In this T-doc, the following agenda items will be treated:

* 7.7.1 RRM core requirement maintenance

1. Intra-band carrier aggregation (CA) scenario: Discussion on RAN2 LS R2-2403963
2. CR collection: CR to 38.133 on HST FR2 Enhanced RRM Core Maintenance

* 7.7.2 RRM performance requirements

1. CRs and Draft CRs collection

# Topic #1 RRM core requirement maintenance: Discussion on RAN2 LS R2-2403963

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2408592 | Huawei, HiSilicon | **Reply LS on RRM enhancements for NR FR2 HST**  **Overall Description:**  RAN4 thanks the LS from RAN2 on on RRM enhancements for NR FR2 HST. During this RAN4 meeting, RAN4 discussed the question and achieved the following conclusion:   * the presence of highSpeedMeasFlagFR2 should be the same for all serving cells in the same frequency band, and * if highSpeedMeasFlagFR2 is present, the HST configuration (set1 or set2) should be the same for all serving cells in the same frequency band as well.   **Actions:**  ACTION: RAN4 respectfully ask RAN2 to take the above agreements into account |
| R4-2408609 | Ericsson | **Discussion on reply LS to RAN2 on RRM enhancements for NR FR2 HST**  **Observation 1:** There are the below options to align RAN4’s understanding and IE definition in RRC message in RAN2.  Option 1: Define ‘highSpeedMeasFlagFR2-r17’ only for SpCell.  Option 2: Define ‘highSpeedMeasFlagFR2-r17’ at the least for SpCell.  Option 3: Define ‘highSpeedMeasFlagFR2-r17’ for SpCell and SCell.  To our understanding, Option 1 is enough, but we’re fine with Option 3, which is in line with FR1 method in which signalings are separately for each cell. |
| R4-2408645 | Nokia | **Discussion of LS from RAN2 on RRM enhancements for NR FR2 HST**   1. It was agreed at RAN4#108 that *highSpeedMeasFlagFR2-r17* signaling is re-used for:    1. Reuse Rel-17 signaling highSpeedMeasFlagFR2 to inform UE whether to apply the enhanced RRM requirements for inter-frequency measurement for FR2 HST in Connected mode.    2. Reuse Rel-17 signaling highSpeedMeasFlagFR2 to inform UE whether to apply the enhanced RRM requirements for intra-frequency measurement on SCC for FR2 HST in Connected mode.    3. Reuse Rel-17 IE highSpeedMeasFlagFR2-r17 in SIB to inform UE whether to apply the enhanced RRM requirements for inter-frequency measurement for FR2 HST in idle mode. 2. RAN4 assumed that HST FR2 feature is used only in dedicated railways deployments, i.e., including all subcarriers allocated to HST FR2 in the frequency band.   **Proposal 1:** In HST FR2 deployments, gNB shall enable RRM enhancements for all serving cells/carrier components in the same frequency band (i.e., intra-band CA) if highSpeedMeasFlagFR2 is present for PCell. |
| R4-2409794 | Nokia | **Reply LS on RRM enhancements for NR FR2 HST**  **Overall Description:**  At RAN2 #125bis, during RAN2 discussion, it was questioned whether gNB should enable RRM enhancements for all serving cells in the same frequency band (i.e. intra-band CA) in consistent manner.  In RAN4 understanding, since HST is a dedicated deployment, all carriers in the same frequency band in CA are deployed for HST. Therefore, the presence of *highSpeedMeasFlagFR2* should be the same for all serving cells in the same frequency band. For example, if *highSpeedMeasFlagFR2* is present for PCell, *highSpeedMeasFlagFR2* should be present to all SCells in the same frequency band as PCell.  RAN4 has agreed that in HST FR2 deployments, gNB shall enable RRM enhancements for all serving cells/carrier components in the same frequency band (i.e., intra-band CA) *highSpeedMeasFlagFR2* is present for PCell.  **Actions:**  ACTION: RAN4 respectfully ask RAN2 to consider the understanding described above, i.e., that in HST FR2 deployments, gNB shall enable RRM enhancements for all serving cells/carrier components in the same frequency band (i.e., intra-band CA) if highSpeedMeasFlagFR2 is present for PCell. |
| R4-2408887 | Samsung | **Discussion on intra-band CA intra-frequency configuration for Rel-18 FR2 HST**   1. The specific signalling highSpeedMeasCA-Scell was introduced for CA enhancement intra-frequency measurements in FR1 HST. 2. The parameter highSpeedMeasFlag is only indicated to apply to the serving frequency of SpCell in FR1 HST   **Observation 3:** For FR2 HST,   * In Rel-17, if the highSpeedMeasFlagFR2-17 is considered, UE shall apply enhanced intra-frequency RRM requirement to the serving frequency of SpCell according to the definition of the IE in TS 38.331 * In Rel-18, if the highSpeedMeasFlagFR2-17 is considered, and UE supports the capability measurementEnhancementCAInterFreqFR2-r18, UE shall apply the enhanced RRM requirements for intra-frequency measurement on SCC in connected mode * There is no dedicated flag indicated for Scell for CA enhancement.   **Observation 4:** For FR2 intra-frequency intra-band case, UE shall be capable of performing measurements for at least 6 cells.  **Observation 5:** Since not only one cell to be measured in the same frequency band, RAN4 agreement "Reuse Rel-17 signaling highSpeedMeasFlagFR2 to inform UE whether to apply the enhanced RRM requirements for intra-frequency measurement on SCC for FR2 HST in Connected mode. " may cause confusion on whether the enhanced RRM requirements for intra-frequency measurement is applied on each/all/which SCC for FR2 HST in Connected mode  **Proposal 1:** For FR2 HST, the definition of HST flag highSpeedMeasFlagFR2-17 for intra-frequency CA enhancement in the current TS 38.331 is not totally aligned to RAN4 intention  **Proposal 2:** In FR2 HST scenairo,   * it can be assumed that intra-band CA RRM requirements are enhanced if applicable implies all the serving frequencies in the same band shall be enhanced. * the RRC configuration parameter highSpeedMeasFlagFR2 can be same configured for different serving cells in the same band   **Proposal 3:** In FR2 HST, gNB should enable RRM enhancements for all serving cells in the same frequency band (i.e. intra-band CA) in consistent manner  **Proposal 4:** In FR2 HST, it is expected to put a restriction for intra-frequency intra-band CA enhancement on PCell for the description of highSpeedMeasFlagFR2-r17 in Rel-18 version to enable：   * UE shall apply enhanced intra-frequency RRM requirements to all serving cells in the same frequency band when the field is present for PCell and the UE supports measEnhCAInterFreqFR2-r18. |
| R4-2408888 | Samsung | **Reply LS to RAN2 on RRM intra-frequency CA measurement enhancements for NR FR2 HST**  **Overall Description:**  RAN4 would like to thank RAN2 for their LS in R2-2403963 and provide response to the following question asked by RAN2.   |  | | --- | | **2. Actions:**  **To RAN4 group:**  **ACTION:** RAN2 respectfully ask RAN4 whether gNB should enable RRM enhancements for all serving cells in the same frequency band (i.e. intra-band CA) in consistent manner. |   RAN4 extensively discussed the issue raised by RAN2, and reached conclusions as follows.   * In FR2 HST scenario, the RRM requirements will be defined under assumption that all carriers in the connected mode are HST carriers, that is all carriers in the same frequency band (i.e. intra-band CA) are deployed for HST * In FR2 HST scenario, the parameter highSpeedMeasFlagFR2 not only applies to serving frequency of PCell but also applies to serving frequencies of all SCells in the same frequency band (i.e. intra-band CA). * RAN4 agreed to reuse legacy Rel-17 requirements for NR intra-frequency measurement, i.e, PCell requirements, for Rel-18 FR2 HST UE supporting intra-frequency intra-band CA. * The corresponding agreement was achieved in RAN4 #107 R4-2310041, below  |  | | --- | | * + Reuse legacy Rel-17 requirements for NR intra-frequency measurement for Rel-18 FR2 HST UE supporting intra-band CA. |   Based on the above conclusions, RAN4 response is as below  **[RAN4 response]**  RAN4 agreed that for FR2 HST, gNB should enable RRM enhancements for all serving cells in the same frequency band (i.e. intra-band CA) in consistent manner.  **Actions:**  RAN4 respectfully asks RAN2 to take above information into account in their specification work |
| R4-2408649 | Nokia | **CR to 38.133 on HST FR2 Enhanced RRM Core Maintenance** |

## Open issues summary

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

### Sub-topic 1-1 Discussion on RAN2 LS R2-2403963

*Sub-topic description:*

*Open issues and candidate options before meeting:*

[Moderator] In RAN2 #125-bis meeting, the LS [R2-2403963] regarding intra-band CA intra-frequency RRM enhancements for NR FR2 HST was sent to RAN4. In their LS, they respectfully ask RAN4 the following question: whether gNB should enable RRM enhancements for all serving cells in the same frequency band (i.e. intra-band CA) in consistent manner. For convenience, the whole LS is copied as below

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| **1. Overall Description:**  In RAN2 #125, RAN2 agreed a TS38.331 CR (R2-2401565) to support RRM enhancement for Rel-18 NR FR2 HST. For the intra-frequency measurement enhancement on SCC, RAN2 agreed to use the existing RRC configuration parameter *highSpeedMeasFlagFR2* in serving cell configuration of each SCell.  During RAN2 discussion, it was questioned whether gNB should enable RRM enhancements for all serving cells in the same frequency band (i.e. intra-band CA) in consistent manner. That is, it is whether the presence of highSpeedMeasFlagFR2 should be the same for all serving cells in the same frequency band. For example, if highSpeedMeasFlagFR2 is present for PCell, highSpeedMeasFlagFR2 should be present to all SCells in the same frequency band as PCell.  Some companies think that given that HST is a dedicated deployment, it is likely that all carriers in the same frequency band in CA are deployed for HST. In this case, if the same HST configuration is applied for all serving cells in the same frequency band, unnecessary complexity in UE implementation could be avoided.  **2. Actions:**  **To RAN4 group:**  **ACTION:** RAN2 respectfully ask RAN4 whether gNB should enable RRM enhancements for all serving cells in the same frequency band (i.e. intra-band CA) in consistent manner. |

Before going deeper into the discussions of the LS reply, recaps from the agreements/conclusions we achieved in the previous meetings and the requirements we defined in the current Spec. are necessary

**[Requirement for intra-frequency measurement for Rel-18 FR2 HST UE supporting intra-band CA]**

1. In RAN4 #107 meeting, RAN4 achieved the following agreements on how to define the requirement for intra-frequency measurement for Rel-18 FR2 HST UE supporting intra-band CA

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| **R4-2310041 WF on FR2 HST RRM requirements (part 1)**  **Issue 2-1-1: Clarification on requirement for intra-frequency measurement for Rel-18 FR2 HST UE supporting intra-band CA**   * Agreement on Monday RRM session:   + Reuse legacy Rel-17 requirements for NR intra-frequency measurement for Rel-18 FR2 HST UE supporting intra-band CA. |

**[Usability of the FR2 HST signaling *highSpeedMeasFlagFR2-r17*]**

1. In RAN4 #108 meeting, RAN4 achieved the following agreements on the FR2 HST signaling *highSpeedMeasFlagFR2-r17*

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| **R4-2314297 WF on FR2 HST RRM requirements (part 1)**  **Issue 2-1-1: Whether need to support separate CA and inter-frequency enhancements for Rel-18 FR2 HST (network flag signaling)**  The following agreement was achieved in Monday session:   * Agreements   + Introduce per-UE capability to indicate whether the UE is capable of supporting the enhanced RRM requirements for Connected and Idle mode inter-frequency measurements for FR2 HST   + FFS whether to introduce a cell specific network signalling to inform UE whether to apply the enhanced RRM requirements for Connected and Idle inter-frequency measurement for FR2 HST.   + FFS: Do not introduce new network indication or UE capabilities to support CA enhancements for R18 FR2 HST   The following agreement was achieved in Tuesday ad-hoc session:   * Agreement:   + Reuse Rel-17 signaling highSpeedMeasFlagFR2 to inform UE whether to apply the enhanced RRM requirements for inter-frequency measurement for FR2 HST in Connected mode.   + Reuse Rel-17 signaling highSpeedMeasFlagFR2 to inform UE whether to apply the enhanced RRM requirements for intra-frequency measurement on SCC for FR2 HST in Connected mode.   **Issue 2-1-2: Whether need to introduce signalling for idle mode inter-frequency measurement requirements**   * Agreement:   + Reuse Rel-17 IE highSpeedMeasFlagFR2-r17 in SIB to inform UE whether to apply the enhanced RRM requirements for inter-frequency measurement for FR2 HST in idle mode.   **Sub-topic 2-2: Intra-frequency measurement requirements on SCC**   * Agreement:   + For UE supporting power class 6 with [highSpeedMeasFlagFR2] configured, the TSSB\_measurement\_period\_intra specified for UE supporting [measurementEnhancementCAInterFreqFR2-r18] shall apply for SCC.     - Specification change is required, because new capability [measurementEnhancementCAInterFreqFR2-r18] is introduced. |

And the LS [R4-2317342] capturing the above agreements were sent to RAN2 in RAN4 #108-bis meeting

1. The definition of *highSpeedMeasFlagFR2* was updated in TS 38.331 v18.1.0 according to the agreements captured in the LS.

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| **TS 38.331 definition v18.1.0**  ***highSpeedMeasFlagFR2***  If the field is present and UE supports ue-PowerClass-v1700 set to pc6, the UE shall apply enhanced intra-frequency RRM requirement to the serving frequency of SpCell to support high speed up to 350 km/h for FR2 as specified in TS 38.133 [14].  If the field is present and the UE supports enhanced inter-frequency RRM requirements for FR2 HST in RRC\_IDLE and RRC\_INACTIVE, the UE shall apply enhanced inter-frequency RRM requirement to support high speed up to 350 km/h for FR2 as specified in TS 38.133 [14] in RRC\_IDLE and RRC\_INACTIVE.  If the field is present for SpCell and the UE supports *measEnhCAInterFreqFR2-r18*, the UE shall apply enhanced inter-frequency RRM requirement to support high speed up to 350 km/h for FR2 as specified in TS 38.133 [14] in RRC\_CONNECTED.  If the field is present for SCell(s) and and the UE supports *measEnhCAInterFreqFR2-r18,* the UE shall apply enhanced intra-frequency RRM requirements to the serving frequency of the corresponding SCell to support high speed up to 350 km/h for FR2 as specified in TS 38.133 [14] in RRC\_CONNECTED.  *The field value, set1 or set2, is applied as specified in TS38.133 [14].* |

\*The IE *highSpeedConfigFR2-r17* is signalled per serving cell basis in both ServingCellConfigCommonSIB and ServingCellConfigCommon

**[Usability of the FR1 HST signaling]**

The corresponding FR1 HST signalling is duplicated as below for information and comparison

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| **TS 38.331 definition v18.1.0**  ***highSpeedMeasCA-Scell***  If the field is present and UE supports measurementEnhancementCA-r17, the UE shall apply the enhanced RRM requirements to the serving frequency of SCell for carrier aggregation to support high speed up to 500 km/h as specified in TS 38.133 [14].  ***highSpeedMeasFlag***  If the field is present and UE supports *measurementEnhancement-r16*, the UE shall apply the enhanced intra-NR and inter-RAT EUTRAN RRM requirements to support high speed up to 500 km/h as specified in TS 38.133 [14].  If the field is present and UE supports intraNR-MeasurementEnhancement-r16, the UE shall apply enhanced intra-NR RRM requirement to support high speed up to 500 km/h as specified in TS 38.133 [14].  If the field is present and UE supports interRAT-MeasurementEnhancement-r16, the UE shall apply enhanced inter-RAT EUTRAN RRM requirement to support high speed up to 500 km/h as specified in TS 38.133 [14].  This parameter only applies to the serving frequency of SpCell. |

\*The IE *highSpeedConfig-r16* is signalled per serving cell basis in both ServingCellConfigCommonSIB and ServingCellConfigCommon, and the IE *highSpeedConfig-v1700* is signalled per serving cell basis in ServingCellConfigCommon

In order to solve the problem from RAN2, it is encouraged companies to share their views under the following issues:

##### **Issue 1-1-1 Whether gNB should enable RRM enhancements for all serving cells in the same frequency band (i.e. intra-band CA) in consistent manner**

* Observations
  + Observation 1 (Nokia):
    - It was agreed at RAN4#108 that *highSpeedMeasFlagFR2-r17* signaling is re-used for:
      * Reuse Rel-17 signaling highSpeedMeasFlagFR2 to inform UE whether to apply the enhanced RRM requirements for inter-frequency measurement for FR2 HST in Connected mode.
      * Reuse Rel-17 signaling highSpeedMeasFlagFR2 to inform UE whether to apply the enhanced RRM requirements for intra-frequency measurement on SCC for FR2 HST in Connected mode.
      * Reuse Rel-17 IE highSpeedMeasFlagFR2-r17 in SIB to inform UE whether to apply the enhanced RRM requirements for inter-frequency measurement for FR2 HST in idle mode.
    - RAN4 assumed that HST FR2 feature is used only in dedicated railways deployments, i.e., including all subcarriers allocated to HST FR2 in the frequency band.
  + Observation 2 (Samsung):
    - The specific signalling highSpeedMeasCA-Scell was introduced for CA enhancement intra-frequency measurements in FR1 HST.
    - The parameter highSpeedMeasFlag is only indicated to apply to the serving frequency of SpCell in FR1 HST
    - For FR2 HST,
      * In Rel-17, if the highSpeedMeasFlagFR2-17 is considered, UE shall apply enhanced intra-frequency RRM requirement to the serving frequency of SpCell according to the definition of the IE in TS 38.331
      * In Rel-18, if the highSpeedMeasFlagFR2-17 is considered, and UE supports the capability measurementEnhancementCAInterFreqFR2-r18, UE shall apply the enhanced RRM requirements for intra-frequency measurement on SCC in connected mode
    - For FR2 intra-frequency intra-band case, UE shall be capable of performing measurements for at least 6 cells.
* Proposals
  + Proposal 1 (Samsung):
    - In FR2 HST scenario,
      * it can be assumed that intra-band CA RRM requirements are enhanced if applicable implies all the serving frequencies in the same band shall be enhanced.
      * the RRC configuration parameter highSpeedMeasFlagFR2 can be same configured for different serving cells in the same band
    - In FR2 HST scenario,
      * The RRM requirements will be defined under assumption that all carriers in the connected mode are HST carriers, that is all carriers in the same frequency band (i.e. intra-band CA) are deployed for HST
      * The parameter highSpeedMeasFlagFR2 not only applies to serving frequency of PCell but also applies to serving frequencies of all SCells in the same frequency band (i.e. intra-band CA).
    - In FR2 HST, gNB should enable RRM enhancements for all serving cells in the same frequency band (i.e. intra-band CA) in consistent manner
  + Proposal 2 (Huawei, HiSilicon):
    - the presence of highSpeedMeasFlagFR2 should be the same for all serving cells in the same frequency band, and
    - if highSpeedMeasFlagFR2 is present, the HST configuration (set1 or set2) should be the same for all serving cells in the same frequency band as well.
  + Proposal 3 (Nokia):
    - In HST FR2 deployments, gNB shall enable RRM enhancements for all serving cells/carrier components in the same frequency band (i.e., intra-band CA) if *highSpeedMeasFlagFR2* is present for PCell
* Candidate options / tentative agreements
  + Option 1:
    - In FR2 HST scenario, the requirements is defined under assumption that all carriers in the same frequency band (i.e. intra-band CA) are deployed for HST in connected mode
    - In FR2 HST, gNB should enable RRM enhancements for all serving cells in the same frequency band (i.e. intra-band CA) in consistent manner
      * The presence of highSpeedMeasFlagFR2 should be the same for all serving cells in the same frequency band
        + If highSpeedMeasFlagFR2 is present, the configured parameters for FR2 HST, i.e., set 1 or set 2, should be the same for all serving cells in the same frequency band
* Recommended WF
  + Discuss whether the two sub-bullets in Option 1 are acceptable and whether to/how to align the wording during the meeting and reflect the tentative agreements in Reply LS

##### **Issue 1-1-2 How to define the highSpeedMeasFlagFR2 for intra-frequency intra-band CA enhancement**

* Proposals and Observations
  + Observation 1 (Ericsson):
    - There are the below options to align RAN4’s understanding and IE definition in RRC message in RAN2.
      * Option 1: Define ‘highSpeedMeasFlagFR2-r17’ only for SpCell.
      * Option 2: Define ‘highSpeedMeasFlagFR2-r17’ at the least for SpCell.
      * Option 3: Define ‘highSpeedMeasFlagFR2-r17’ for SpCell and SCell respectively.
    - To our understanding, Option 1 is enough, but we’re fine with Option 3, which is in line with FR1 method in which signalings are separately for each cell.
  + Observation 2 (Samsung):
    - RAN4 agreed to reuse legacy Rel-17 requirements for NR intra-frequency measurement, i.e, PCell requirements, for Rel-18 FR2 HST UE supporting intra-frequency intra-band CA.
      * The corresponding agreement was achieved in RAN4 #107 R4-2310041, below

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| * + Reuse legacy Rel-17 requirements for NR intra-frequency measurement for Rel-18 FR2 HST UE supporting intra-band CA. |

* + Proposal 1 (Samsung):
    - In FR2 HST, it is expected to put a restriction for intra-frequency intra-band CA enhancement on PCell for the description of highSpeedMeasFlagFR2-r17 in Rel-18 version to enable:
      * UE shall apply enhanced intra-frequency RRM requirements to all serving cells in the same frequency band when the field is present for PCell and the UE supports measEnhCAInterFreqFR2-r18.
  + Proposal 2 (Nokia):
    - In HST FR2 deployments, gNB shall enable RRM enhancements for all serving cells/carrier components in the same frequency band (i.e., intra-band CA) if *highSpeedMeasFlagFR2* is present for PCell
* Candidate options / tentative agreements:
  + Option 1:
    - * In HST FR2, UE shall apply enhanced intra-frequency RRM requirements to all serving cells in the same frequency band when *highSpeedMeasFlagFR2* is present for PCell and the UE supports measEnhCAInterFreqFR2-r18.
  + Option 2:
    - * RAN4 agreed to reuse legacy Rel-17 requirements for NR intra-frequency measurement, i.e, PCell requirements, for Rel-18 FR2 HST UE supporting intra-frequency intra-band CA.
        + The corresponding agreement was achieved in RAN4 #107 R4-2310041, below

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| * + Reuse legacy Rel-17 requirements for NR intra-frequency measurement for Rel-18 FR2 HST UE supporting intra-band CA. |

* Recommended WF
  + Discuss whether Option 1 is acceptable, and whether Option 2 is needed for information during the meeting and reflect the tentative agreement in Reply LS

### Sub-topic 1-2 CR collection

##### **Issue 1-2-1: CR to 38.133 on HST FR2 Enhanced RRM Core Maintenance**

* Proposals
  + R4-2408649 (Nokia)

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| **Summary of change indicated in R4-2408649:**  On top of the agreed big CRs: 1) Update the Rel-18 FR2 enhanced HST parameters/ capability/signalling names based on the latest RAN2 agreements; 2) Correct value of N is introduced for Table 9.5.4.1-3 for FR2 HST. |

[Moderator]

* + It is encouraged companies to check whether the big CR R4-2408649 can be agreed in RAN4 #111 meeting.

# Topic #2 RRM performance requirements: CRs and Draft CRs collection

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

In this topic,

* The draft test case CRs are collected (from Sub-topic 2-1 to Sub-topic 2-4)
* The big CR on Rel-18 HST FR2 RRM performance requirements for agreement is captured (Sub-topic 2-5).
* The draft CR on PC6 missing testing parameters in Annex B is captured (Sub-topic 2-6).

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2408593 | Huawei, HiSilicon | **Test case for SA event triggered reporting for Rel-18 FR2 HST inter-frequency measurement with SSB time index detection when DRX is not used (Pcell in FR2)** |
| R4-2408642 | Nokia | **Draft CR to 38.133 on UL Timing and TCI State Switch Test Case for HST FR2 Enhanced** |
| R4-2408839 | Ericsson | **(NR\_HST\_FR2\_enh-Perf) draft CR on SA event triggered reporting tests for Rel-18 FR2 HST intra-band CA without SSB time index detection when DRX is not used** |
| R4-2408889 | Samsung | **Draft CR to 38.133 on test case for SSB based L1-RSRP for FR2 PC6 UE with multi-Rx** |
| R4-2408644 | Nokia | **Draft CR to 38.133 on Enhanced Intra-Frequency Measurements Test Case for HST FR2 Enhanced** |
| R4-2408890 | Samsung, Nokia, Qualcomm, Ericsson | **Draft CR to 38.133 on new 2AoA setup for multi-Rx chain DL reception in Rel-18 FR2 HST** |
| R4-2408643 | Nokia | **Draft CR to 38.133 on Enhanced Intra-Frequency Measurements Test Case for HST FR2 Enhanced** |
| R4-2408894 | Samsung | **Big CR to TS 38.133 on Rel-18 HST FR2 RRM performance requirements** |

## Open issues summary

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

### Sub-topic 2-1 Draft CR on Inter-frequency measurement with measurement gaps for Rel-18 FR2 HST

*Sub-topic description*

*Open issues and candidate options before meeting:*

##### **Issue 2-1-1 Draft CR on SA event triggered reporting tests for Rel-18 FR2 HST intra-band CA with SSB time index detection when DRX is not used (Pcell in FR2) for Rel-18 FR2 HST**

* Proposals
  + R4-2408593 (Huawei, HiSilicon)

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| **Summary of change indicated in R4-2408593:**  On top of the endorsed big CR [R4-2403320] and endorsed CR [R4-2403404], update the test case for SA event triggered reporting for Rel-18 FR2 HST inter-frequency measurement with SSB time index detection when DRX is not used (Pcell in FR2). |

* Recommended WF
  + Use the draft CR as a baseline for further revisions.

##### **Issue 2-1-2 Draft CR on SA event triggered reporting tests for Rel-18 FR2 HST intra-band CA without SSB time index detection when DRX is not used (Pcell in FR2) for Rel-18 FR2 HST**

* Proposals
  + R4-2408839 (Ericsson)
* Recommended WF
  + Use the draft CR as a baseline for further revisions.

### Sub-topic 2-2 Draft CR on UL timing adjustment for Rel-18 FR2 HST

##### **Issue 2-2-1 Draft CR on one shot large UL timing adjustment for Rel-18 FR2 HST**

* Proposals
  + R4-2408642 (Nokia)

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| **Summary of change indicated in R4-2408642:**  Introduction a new test cases under section A.7.5.8.3 to test  TCI state switchign dealy and timing adjustment for PC6 UE supporting [*highSpeedTCISwitchEnhMAC*-CE-FR2-r18] when [*R18 enhanced MAC-CE indication*] is indicated as ‘0’. |

* Recommended WF
  + Use the draft CR as a baseline for further revisions.

### Sub-topic 2-3 Draft CR on SSB based L1-RSRP for Rel-18 FR2 HST

##### **Issue 2-3-1 Draft CR on SSB based L1-RSRP measurement when DRX is used for FR2-1 PC6 UEs supporting SimultaneousReceptionFR2HST-r18 for Rel-18 FR2 HST**

* Proposals
  + R4-2408889 (Samsung)

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| **Summary of change indicated in R4-2408889:**   1. Test case for SSB based L1-RSRP measurement requirement when DRX is used for FR2-1 PC6 UEs supporting SimultaneousReceptionFR2HST-r18 is introduced. 2. The test case is drafted according to WF captured in R4-2321349. 3. On top of R4-2406409 4. Io is re-calculated 5. The L1-RSRP reporting period in test requirements is re-defined 6. The range of Rx antenna gain Gmin and Gmax are updated to align with the values defined in Annex B, Table B.2.1.5.1-1 |

* Recommended WF
  + Use the draft CR as a baseline for further revisions.

### Sub-topic 2-4 Draft CR on intra-frequency measurements with/without measurement gaps for Rel-18 FR2 HST

* Proposals
  + R4-2408644 (Nokia)
* Recommended WF
  + Use the draft CR as a baseline for further revisions.

### Sub-topic 2-5 Big CR to TS 38.133 on Rel-18 HST FR2 RRM performance requirements

* Proposals
  + R4-2408894 (Samsung)

[Moderator]

* + The big CR will be revised by capturing the draft CRs endorsed in RAN4 #111 meeting.

### Sub-topic 2-6 Draft CR on missing testing parameters for PC6 in Annex B

* Proposals
  + R4-2408643 (Nokia)

[Moderator]

* + This draft CR can be revised and endorsed during RAN4 #111 meeting based on the parameters agreed in the parallel discussed WI: [111][230] Reply\_LS

### Sub-topic 2-7 Draft CR on new 2AoA setup for multi-Rx chain DL reception in Rel-18 FR2 HST

* Proposals
  + R4-2408890 (Samsung, Nokia, Qualcomm, Ericsson)
* Recommended WF
  + Use the draft CR as a baseline for further revisions.