**3GPP TSG-RAN WG4 Meeting # 108 R4-23XXXXX**

**Toulouse, France, Aug 21–25 , 2023**

**Agenda item:** 5.4

**Source:** Moderator (Apple)

**Title:** Topic summary for [108][202] Maintenance\_R17

**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 this section, the following topics are included

* 5.2.3 Rel-17 NR\_pos\_enh
* 5.2.3 Rel-17 NR\_MG\_enh-Core
* 5.2.3 NR\_UE\_power\_sav\_enh-Core
* 5.2.3 NR\_FeMIMO-Core
* 5.2.3 NR\_RRM\_enh2-Core
* 5.2.3 LTE\_NR\_DC\_enh2-Core
* 5.3 TEI

# Topic #1: Rel-17 NR\_pos\_enh

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

## Companies’ contributions summary

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| **T-doc number** | **Title** | **Company** | **Proposals / Observations** |
| [**R4-2311988**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2311988.zip) | [NR\_pos\_enh-Perf] Updated simulation results for PRS-RSRPP | Qualcomm Incorporated | In this paper we provide updated simulation results for PRS-RSRPP accuracy requirements. These new simulation results supersede our previously submitted results |
| [**R4-2313400**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313400.zip) | NR\_pos\_enh-Core: On per-FR measurement gaps for positioning | Nokia, Nokia Shanghai Bell | 1. RAN4 to remove the restriction for using MG patterns #24 and #25 for per-UE MG only, from Rel-17 for UE supporting independent measurement gaps. 2. RAN4 to agree changes in clause 9.1.2 removing the restriction of selecting GP#24 or #25, in case of independent measurement gaps.   The following observations are made:   1. No further clarification is needed in TS 38.133 for assignment of PRS measurements to a measurement gap in case of non-concurrent independent measurement gaps.   No further clarification is needed in TS 38.133 for assignment of PRS measurements to a measurement gap in case of concurrent independent measurement gaps.  For Proposal 2, the companion CR is submitted in [4]. |

## Open issues summary

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

1. (Nokia) RAN4 to remove the restriction for using MG patterns #24 and #25 for per-UE MG only, from Rel-17 for UE supporting independent measurement gaps.
2. (Nokia) RAN4 to agree changes in clause 9.1.2 removing the restriction of selecting GP#24 or #25, in case of independent measurement gaps.

# Topic #2: Rel-17 NR\_MG\_enh-Core

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

## Companies’ contributions summary

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| **T-doc number** | **Title** | **Company** | **Proposals / Observations** |
| [**R4-2312013**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2312013.zip) | Remaining issues on Rel-17 MG enh | Ericsson | *Proposal 1: In Rel-17, when UE supports NCSG capability, all deactivated SCell will be measured within NCSG regardless of further UE capability reporting of intraFreq-needForNCSG.* |
| [**R4-2312810**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2312810.zip) | [NR\_MG\_enh-Core] Discussion on remaining issues in Rel-17 MGE | Huawei, HiSilicon | Proposal 1: UE capability *concurrentMeasGapEUTRA-r17* also applies when both LTE MOs are MOs of other RATs are configured.  Proposal 2: Measurement of deactivated SCell in NCSG does not depend on UE capability report in intraFreq-needForNCSG. |
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## Open issues summary

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

Proposal 1 (Ericsson): In Rel-17, when UE supports NCSG capability, all deactivated SCell will be measured within NCSG regardless of further UE capability reporting of intraFreq-needForNCSG.

Proposal 2 (Huawei): Measurement of deactivated SCell in NCSG does not depend on UE capability report in intraFreq-needForNCSG.

Proposal 3 (Huawei): UE capability concurrentMeasGapEUTRA-r17 also applies when both LTE MOs are MOs of other RATs are configured.

# Topic#3: NR\_UE\_power\_sav\_enh-Core

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

## Companies’ contributions summary

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| **T-doc number** | **Title** | **Company** | **Proposals / Observations** |
| [**R4-2312860**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2312860.zip) | Discussion on maintaining issues for RLM/BFD relaxation requirements | Huawei, HiSilicon | ***Observation 1: According to the definition in section 3.6.1 in TS38.133, a short active time period due to some timers are running in DRX mode is still considered as “no DRX is used”, which means “no DRX is used” is not equivalent to the non-DRX mode.***  ***Observation 2: In R17, RAN4 agreed that whether RLM/BFD relaxation can be applied depends on the serving cell quality and UE mobility state, where the evaluation period for good serving cell quality criterion are defined as multiple DRX cycles and the evaluation period for low-mobility criterion are configured as multiple*** ***seconds.***  ***Observation 3: For RLM/BFD relaxation, the durations of DRX related timers are usually quite short and no longer than one DRX cycle, and the serving cell quality and UE mobility state will not change significantly during these timers running time.***  ***Observation 4: If UE changes frequently between relaxation mode and non-relaxation mode due to short timer running, the power saving gain due to RLM/BFD relaxation is meaningless for UE.***  ***Proposal 1: For RLM/BFD relaxation requirements, the conditions for DRX cycle applicability need to be updated and can be defined as follow:***  ***- No DRX is configured or used DRX cycle is longer than 80ms*** |
| [**R4-2313295**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313295.zip) | [NR\_UE\_pow\_sav\_enh-Core]Discussion on maintenance issues in R17 RLMBFD relaxation | vivo | **Proposal 1 The applicability condition of ‘DRX is used’ is revised from R15, so that it can be interpreted the same as ‘DRX is configured’, which aligns to the intention of all current RRM requirements that this term exist in the description.** |

## Open issues summary

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

* On the applicability condition of RLM/BFD relaxation
  + *Option 1 (Huawei): For RLM/BFD relaxation requirements, the conditions for DRX cycle applicability need to be updated and can be defined as follow:*
    - *No DRX is configured or used DRX cycle is longer than 80ms*
  + Option 2: The term “No DRX is configured” is same as “No DRX is used”

# Topic #4: NR\_FeMIMO-Core

## Companies’ contributions summary

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| **T-doc number** | **Title** | **Company** | **Proposals / Observations** |
| [**R4-2313118**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313118.zip) | [NR\_FeMIMO-Core] Discussion on remaining issues for R17 FeMIMO | ZTE Corporation | **Observation 1: Once the SSB used for L1-RSRP and the PDCCH/PDSCH share the same TCI state, which means the UE can receive such two signals by the same Rx beam.**  **Proposal 1: RAN4 to introduce L1-RRSP requirements for TSSB\_CDP = TSMTC**  **RAN4 to introduce equal sharing between SC and NSC L1-RSRP.** |
| [**R4-2313292**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313292.zip) | [NR\_feMIMO-Core]Discussion on maintenance issues in R17 feMIMO RRM requirements | vivo | **Observation 1 Current TS 38.133 is broken, because based on current PL-RS definition, if PL-RS is changed in the UL TCI state switch, and the PL-RS of FR2 target TCI is SSB, there will be no requirements. However, for R17 ICBM, the PL-RS of additional cell can only be SSB.**  **Proposal 1 Add an additional PL-RS maintained condition: PL-RS is maintained as long as UE has performed L1-RSRP measurement on the same RS that used for PL-RS in the recent 5 L1 measurement period.**  **Observation 2 For inter-cell beam managements, UE is not mandated to support sequential interference cancellation between the Rx signals from 2 different cells.**  **Proposal 2 From RRM requirements perspective, introduce requirement applicability for the cases when UE simultaneously receive SSB and PDSCH/PDCCH, while SSB is associated to a PCI different from the PCI to which the active TCI of PDSCH/PDCCH is associated. RRM requirements do not apply for these cases.** |

## Open issues summary

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

* *Proposal 1 (ZTE): RAN4 to introduce L1-RRSP requirements for TSSB\_CDP = TSMTC. RAN4 to introduce equal sharing between SC and NSC L1-RSRP.*
* *Proposal 2 (vivo): Add an additional PL-RS maintained condition: PL-RS is maintained as long as UE has performed L1-RSRP measurement on the same RS that used for PL-RS in the recent 5 L1 measurement period.*
* *Proposal 3 (vivo): From RRM requirements perspective, introduce requirement applicability for the cases when UE simultaneously receive SSB and PDSCH/PDCCH, while SSB is associated to a PCI different from the PCI to which the active TCI of PDSCH/PDCCH is associated. RRM requirements do not apply for these cases.*

# Topic #5: LTE\_NR\_DC\_enh2-Core

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

## Companies’ contributions summary

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| **T-doc number** | **Title** | **Company** | **Proposals / Observations** |
| [**R4-2313353**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313353.zip) | LTE\_NR\_DC\_enh2-Core Aspects on Efficient activation/de-activation mechanism for one SCG | Nokia, Nokia Shanghai Bell | 1. If ‘*bdf-and-RLM*’ with value ‘*true*’ is configured for the deactivated PSCell the UE shall perform BFD and RLM on the deactivated PSCell.   Evaluation of RLM and BFD on a deactivated PSCell requires the UE to measure the deactivated PSCell regularly to evaluate the downlink radio link quality.  If UE is configured with *bfd-and-RLM* and has not detected either beam failure or RLF on the deactivated PSCell, there is no need for additional measurements at PSCell activation.   1. A UE which has not detected either BFD or RLF on the deactivated PSCell, need no additional measurements at PSCell activation (Tsearch = 0ms). 2. A UE which has detected either BFD or RLF on the deactivated PSCell is allowed additional measurements at PSCell activation (Tsearch = [TBD]ms). 3. For RACH based PSCell activation, RAN4 need to reconsider *Tsearch = 24\* Trs ms* for an unknown PSCell being activated with ‘*bdf-and-RLM*’ with value ‘*true*’. 4. For RACH based PSCell activation, Tsearch should account for the RLM or BFD status upon activation.   The current RAN4 requirements are potentially breaking the RAN2 procedures.   1. For RACH-less based PSCell activation, Tsearch = 0 ms conditions needs to be reconsidered. 2. For RACH-less based PSCell activation, the UE behavior when the PSCell is unknown would need to be clarified.   Tsearch in RACH-less based PSCell activation delay:   1. Define RACH-less based PSCell activation delay such that it is not only conditioned on the when the last valid measurement report was sent. 2. For the RACH-less based PSCell activation the condition when Tsearch = 0ms additionally applies while the TCI state is known. 3. For RACH-less based PSCell activation, if *bfd-and-RLM* is configured and TCI state is known or if the PSCell is a known FR2 PScell, Tsearch = 0 ms~~. if the target cell is a known FR2 PScell~~. Otherwise, there are no requirements.   Tsearch in RACH-based PSCell activation delay:   1. For RACH based PSCell activation, if the target cell is a known NR FR2 PSCell, Tsearch = 0 ms. If the target cell is an unknown FR2 PSCell configured with bfd-and-RLM with value true and no RLM has occurred, then Tsearch = [12]\* Trs ms, otherwise if Es/Iot ≥ -2 dB, then Tsearch = 24\* Trs ms..   Known condition for PSCell activation:   1. Capture the condition that when *bfd\_and\_RLM* with value *true* is configured and the TCI state is known the PSCell is known.   Requirements for deactivated SCG in FR1  FR2 SCG activation discussion is also valid for FR1 SCG activation in Rel-18 WI.  PSCell activation delay and PSCell DRX:   1. UE shall start monitoring PDCCH on the activated PSCell immediately after the SCG activation delay. |
| [**R4-2313356**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313356.zip) | LTE\_NR\_DC\_enh2-Core Alignment of RAN4 requirements with RAN2 procedures | Nokia, Nokia Shanghai Bell | 1. tci-ActvtedConfig can be configured for the Direct activated PSCell only. 2. tci-ActivatedConfig can be configured for a deactivated SCell and direct activated SCell. |
| [**R4-2313569**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313569.zip) | Discussion on SCG Rel-17 RRM enhancement | Ericsson | ***Proposal 1: RAN4 shall clarify the UE behavior with RAN2 when the configured TAT timer is still running while target cell being considered*** *as unknown.*  ***Proposal 2: For RACH-less activation, target cell is known:***  ***- During the last 5 seconds before the reception of the SCG activation command:***  ***- The configured TAT timer alignment timer is running***  ***- One of the SSBs measured from the PSCell being activated remains detectable according to the cell identification conditions specified in clause 9.3.***  ***- One of the SSBs measured from PSCell being activated also remains detectable during the PSCell activation delay Tactivation\_time according to the cell identification conditions specified in clause 9.3.***  ***Proposal 3: RAN4 do not agree to introduce scheduling restriction “if the TCI state of the PDSCH /PDCCH is associated to the SSB of the cell with different PCI, UE is not expected to receive PDSCH/PDCCH on the symbols corresponding to the SSB indexes configured for L1-RSRP measurement on the serving cell.*** |

## Open issues summary

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

1. (Nokia) A UE which has not detected either BFD or RLF on the deactivated PSCell, need no additional measurements at PSCell activation (Tsearch = 0ms).
2. (Nokia) A UE which has detected either BFD or RLF on the deactivated PSCell is allowed additional measurements at PSCell activation (Tsearch = [TBD]ms).
3. (Nokia) For RACH based PSCell activation, RAN4 need to reconsider *Tsearch = 24\* Trs ms* for an unknown PSCell being activated with ‘*bdf-and-RLM*’ with value ‘*true*’.
4. (Nokia) For RACH based PSCell activation, Tsearch should account for the RLM or BFD status upon activation.
5. (Nokia) For RACH-less based PSCell activation, Tsearch = 0 ms conditions needs to be reconsidered.
6. (Nokia) For RACH-less based PSCell activation, the UE behavior when the PSCell is unknown would need to be clarified.

Tsearch in RACH-less based PSCell activation delay:

1. (Nokia) Define RACH-less based PSCell activation delay such that it is not only conditioned on the when the last valid measurement report was sent.
2. (Nokia) For the RACH-less based PSCell activation the condition when Tsearch = 0ms additionally applies while the TCI state is known.
3. (Nokia) For RACH-less based PSCell activation, if *bfd-and-RLM* is configured and TCI state is known or if the PSCell is a known FR2 PScell, Tsearch = 0 ms~~. if the target cell is a known FR2 PScell~~. Otherwise, there are no requirements.

Tsearch in RACH-based PSCell activation delay:

1. (Nokia) For RACH based PSCell activation, if the target cell is a known NR FR2 PSCell, Tsearch = 0 ms. If the target cell is an unknown FR2 PSCell configured with bfd-and-RLM with value true and no RLM has occurred, then Tsearch = [12]\* Trs ms, otherwise if Es/Iot ≥ -2 dB, then Tsearch = 24\* Trs ms..

Known condition for PSCell activation:

1. (Nokia) Capture the condition that when *bfd\_and\_RLM* with value *true* is configured and the TCI state is known the PSCell is known.

PSCell activation delay and PSCell DRX:

1. (Nokia) UE shall start monitoring PDCCH on the activated PSCell immediately after the SCG activation delay.

Proposal 13: (Ericsson) RAN4 shall clarify the UE behavior with RAN2 when the configured TAT timer is still running while target cell being considered as unknown.

Proposal 14: (Ericsson) RAN4 do not agree to introduce scheduling restriction “if the TCI state of the PDSCH /PDCCH is associated to the SSB of the cell with different PCI, UE is not expected to receive PDSCH/PDCCH on the symbols corresponding to the SSB indexes configured for L1-RSRP measurement on the serving cell.

Proposal 10: (Ericsson) For RACH-less activation, target cell is known:

- During the last 5 seconds before the reception of the SCG activation command:

- The configured TAT timer alignment timer is running

- One of the SSBs measured from the PSCell being activated remains detectable according to the cell identification conditions specified in clause 9.3.

- One of the SSBs measured from PSCell being activated also remains detectable during the PSCell activation delay Tactivation\_time according to the cell identification conditions specified in clause 9.3.

# Topic #6: NR\_RRM\_enh2

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

## Companies’ contributions summary

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| **T-doc number** | **Title** | **Company** | **Proposals / Observations** |
| [**R4-2312402**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2312402.zip) | [NR\_RRM\_enh2-Core] Discussion on maintenance for R17 RRM enhancement | Huawei, HiSilicon | **Observation 1: In legacy multiple SCell activation requirements as specified in section 8.3.7, it is always assumed that Cell search is not needed for an FR2 to-be-activated SCell.**  **Observation 2: Only sharing of cell search among FR1 Cells are considered in legacy requirements.**  **Observation 3: The sharing of cell search between FR1 and FR2 PUCCH SCell are not considered in existing requirements.**  **Proposal 1: Update the requirements for PUCCH SCell activation with multiple SCells as follows:**   |  | | --- | | Where:  - If the to-be-activated FR2 PUCCH SCell is unknown without active serving cell(s) or known to-be-activated non-PUCCH SCell (s) on the same band, Tactivation\_time\_multiple\_scells ­ is the SCell activation delay in milliseconds for FR2 PUCCH SCell equal to Tactivation\_time + TFR1\_N1,  - Tactivation\_time is specified in section 8.3.2, and  - TFR1\_N1 is the maximum value of TFirstSSB\_MAX\_multiple\_scells + TSMTC\_MAX\_multiple\_scells+Trs\*N1 for SCells counted in N1 as defined in 8.3.7.  - Otherwise, Tactivation\_time\_multiple\_scells is the target SCell activation delay in millisecond in multiple SCell activation scenario as specified in section 8.3.7. | |
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## Open issues summary

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

**Proposal 1: (Huawei) Update the requirements for PUCCH SCell activation with multiple SCells as follows:**

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| --- |
| Where:  - If the to-be-activated FR2 PUCCH SCell is unknown without active serving cell(s) or known to-be-activated non-PUCCH SCell (s) on the same band, Tactivation\_time\_multiple\_scells ­ is the SCell activation delay in milliseconds for FR2 PUCCH SCell equal to Tactivation\_time + TFR1\_N1,  - Tactivation\_time is specified in section 8.3.2, and  - TFR1\_N1 is the maximum value of TFirstSSB\_MAX\_multiple\_scells + TSMTC\_MAX\_multiple\_scells+Trs\*N1 for SCells counted in N1 as defined in 8.3.7.  - Otherwise, Tactivation\_time\_multiple\_scells is the target SCell activation delay in millisecond in multiple SCell activation scenario as specified in section 8.3.7. |

# Topic #7: Other TEI

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

## Companies’ contributions summary

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| **T-doc number** | **Title** | **Company** | **Proposals / Observations** |
| [**R4-2313816**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313816.zip) | [TEI] List of R17 FR1/LTE+FR2 test cases in annex A | Ericsson | 1. RAN4 to allocate work split among the companies for the identified test cases. 2. RAN4 to further identify the list of test cases for other WI which are identified as non-testable due to OTA testing issue. |
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## Open issues summary

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

* On the list of R17 FR1/LTE+FR2 test cases in annex A
  1. (Ericsson) RAN4 to allocate work split among the companies for the identified test cases.
  2. (Ericsson)RAN4 to further identify the list of test cases for other WI which are identified as non-testable due to OTA testing issue.