**3GPP TSG-RAN4 Meeting #99-eR4-21xxxxx**

**Online, 19 – 27 May, 2021**

**Agenda item:** 5.1.3

**Source:** Moderator (Apple)

**Title:** Email discussion summary for [99e][208] NR\_RRM\_Enh\_RRM\_3

**Document for:** Information

# Introduction

This email discussion summary includes multiple Scell activation/deactivation, 5.1.3.2.2.5 Inter-frequency measurement requirement without MG, UE-specific CBW change and 5.1.3.2.2.9 Inter-band CA requirement for FR2 UE measurement capability of independent Rx beam, in AI 5.1.3.1, 5.1.3.2.2.2/5/7/9.

# Topic #1: Core maintenance (5.1.3, 5.1.3.1)

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

## Companies’ contributions summary

|  |  |  |  |
| --- | --- | --- | --- |
| **T-doc number** | **Title** | **Company** | **Proposals / Observations** |
| [**R4-2109523**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109523.zip) | CR on inter-frequency measurement without measurement gap | CMCC | Correct the table caption. |
| [**R4-2109524**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109524.zip) | CR on inter-frequency measurement without measurement gap | CMCC |  |
| [**R4-2109883**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109883.zip) | CR on TS38.133 for typo modifications on intra frequency and inter frequency measurement requirement | MediaTek inc. | * Add a missing CSSFintra factor in Table 9.2.5.2-5.
* Correct the typo on the title of table:
	+ From “Table 9.3.4-1” to “Table 9.3.9-1”
	+ From “Table 9.3.4-2” to “Table 9.3.9-2”
	+ From “Table 9.3.4-3” to “Table 9.3.9-3”
* Correct the typo on Table 9.3.9-3
	+ From “TSSB\_time\_index\_intra” to “TSSB\_time\_index\_inter”
* Correct the typo on the title of Table 9.3.9-1 and 9.3.9-2
	+ From “with gaps” to “without gaps”
	+ From “T SSB\_measurement\_period\_intra” to “T SSB\_measurement\_period\_inter”
 |
| R4-2109884 | CR on TS38.133 for typo modifications on intra frequency and inter frequency measurement requirement | MediaTek inc. |  |
| [**R4-2109988**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109988.zip) | Remaining issues on Multiple SCell activation | Ericsson | ***Observation 1: Aligning SMTC offset cannot solve the performance degradation on active serving cells when active serving cells have the different SMTC periodicity with SCells being activated in the same band.******Proposal 1: There is no performance degradation issue for active serving cells* due to AGC *retuning for SCell being activated when**** *to-be-activated unknown SCells have active serving cell(s) or known SCell being activated(s) on the same band in FR2, or*
* *all SCells being activated don’t need AGC retuning, or*
* ***no active serving cell in the same band with the SCell being activated which needs AGC retuning***

***Proposal 2: To avoid the performance degradation for active serving cell, RF retuning occasion shall base on the SCell(s) which has active serving cells in the same band other than any SCell which has the earliest SMTC occasion after THARQ+3ms.******Proposal 3: Define ‘common SMTC occasion’ when two or more bands have the SCells being activated and active serving cells in the same band as follow.******there for K SCells being activated exists a set of non-zero integers N1, ..., NK and a value X fulfilling the following:******- SMTC offset#m + Nm×SMTC period#m = X, for m=1,...,K, where SMTC offset#m and SMTC period#m are SMTC offset and SMTC period, respectively, for the m-th Scell in the set of K SCells to be activated.******Proposal 4: When common SMTC occasion exists for all SCells being activated and more than one band has the SCell being activated and the active serving cell(s) in the same band, the RF retuning occasionshall base on the common SMTC occasion for all SCells being activated.******Proposal 5: When common SMTC occasion non-exists for SCells being activated and more than band has the SCell(s) being activated and active serving cell(s) in the same band, the performance degradation for active serving cells which are in the same band with latter SCells being activated is expected. RAN4 should further enhance this scenario in the latter release.******Proposal 6: The TFirstSSB\_MAX\_multiple\_scells definition for multiple SCell activation requirement shall be updated as follows.***

|  |
| --- |
| *TFirstSSB\_MAX\_multiple\_scells: is the time**- TFirstSSB\_MAX, band #k, when only one band’s SCell(s) being activated has active serving cell(s) in the same band;**- max {TFirstSSB\_MAX, band #i} i = 1, 2, …, maxBands, when common SMTC occasion exists for all SCells being activated and more than one band’s SCell(s) being activated have active serving cell(s) in the same band;* *Where, the common SMTC occasion can be defined as* *there for K SCells being activated exists a set of non-zero integers N1, ..., NK and a value X fulfilling the following:**- SMTC offset#m + Nm×SMTC period#m = X, for m=1,...,K, where SMTC offset#m and SMTC period#m are SMTC offset and SMTC period, respectively, for the m-th Scell in the set of K SCells to be activated.**- min {TFirstSSB\_MAX, band #i} i = 1, 2, …, maxBands, when* *- all SCells being activated are on FR2, or**- no additional AGC retuning is needed for all SCells being activated, or**- no active serving cell(s) in the same band with the SCells being activated which need AGC retuning, or**- SMTC offset is different for all SCells being activated and more than one band’s SCell(s) being activated have active serving cell(s) in the same band* *When more than one bands’ SCell(s) being activated have active serving cell(s) in the same band and SMTC offset is different, performance degradation can be expected for active serving cell(s) with SCell(s) being activated in the same band #i after min{TFirstSSB\_MAX, band #i} to the TFirstSSB\_MAX, band #i.* *Where,* *maxBands is the maximum number of UE supported bands which have SCells being activated.**TFirstSSB\_MAX, band #k is the TFirstSSB\_MAX, band #i time for the band #k which has active serving cell(s) and to-be-activated SCell(s).* *TFirstSSB\_MAX, band #i is the time to the end of the first complete SSB burst indicated by the SMTC after slot n +* $\frac{T\_{HARQ}+3ms}{NR slot length}$ *for the SCell(s) being activated in band #i, further fulfilling:**- In FR1, in case of active serving cell(s) in the same band with SCell(s) being activated, the occasion when all active serving cell(s) and SCell(s) being activated or released are transmitting SSB bursts in the same slot; otherwise, the first SMTC occasion when the SCell(s) being activated are transmitting SSB burst.**- In FR2, the occasion when all active serving cell(s) and SCell(s) being activated or released are transmitting SSB bursts in the same slot.*  |

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| [**R4-2109989**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109989.zip) | CR on TS38.133 multiple SCell activation - r16 | Ericsson | CR based on discussion paper [**R4-2109988**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109988.zip) |
| R4-2109990 | CR on TS38.133 multiple SCell activation - r17 | Ericsson |  |
| [**R4-2110900**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110900.zip) | Discussion on remaining issues in multiple SCell activation | Huawei, HiSilicon | **Proposal 1: If SMTC offset is different among** * **SCells in different bands activated by the same MAC CE if UE does not support per FR gap, or**
* **SCells in different FR1 bands activated by the same MAC CE if UE supports per FR gap,**

**for activated FR1 serving cells in the same band as an unknown to-be-activated SCell, there may be more interruption than allowed in clause 8.2 due to multiple SCell activation.** |
| [**R4-2110901**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110901.zip) | CR on SMTC alignment in multiple SCell activation | Huawei, HiSilicon | CR based on discussion paper [**R4-2110900**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110900.zip) |
| R4-2110902 | CR on SMTC alignment in multiple SCell activation R17 | Huawei, HiSilicon |  |

## Open issues summary

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

### Sub-topic 1-1: Inter-frequency measurement without MG

*Sub-topic description:*

*Open issues and candidate options before e-meeting:*

**Issue 1-1: There are many same revision between R4-2109523(CMCC) and R4-2109883(MTK), which one could be used as baseline?**

* + Option 1: use R4-2109523(CMCC), and merge R4-2109883(MTK) into R4-2109523(CMCC)
	+ Option 2: use R4-2109883(MTK), and merge R4-2109523(CMCC) into R4-2109883(MTK)
* Recommended WF
	+ Moderator: suggest CMCC and MTK to coordinate with each other to choose one CR as baseline.
* 1st round Comment collection:

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Huawei | Changes in both CR are fine. |
| CMCC | We are OK to merge our CR to MTK’s CR. But we think MTK’s CR need to be revised:Firstly, the table index of the tables in 9.3.9.2 also need be updated, and the details can be found in our CR.Secondly, we observe that MTK’s CR also include the CSSF update for Rel-16 HST, which is overlapped with CR R4-2109526, and this CR is under discussion in #204. It is suggested that MTK’s CR could focus on the issues on inter-f measurement without MG. And the CSSF update for Rel-16 HST can be covered by CR R4-2109526 and discussed in email thread #204(Rel-16 NR RRM maintenance). |
| Nokia | In general, the correction in both CRs looks agreeable. Once a merged CR is available final agreement can likely be reached. |
| Ericsson | Changes in both CRs are fine. |

### Sub-topic 1-2: Multiple Scell activation

*Sub-topic description*

*Open issues and candidate options before e-meeting:*

**Issue 1-2: Condition of SMTC configuration to apply multiple SCell activation requirement**

* Proposals
	+ Option 1 (Ericsson):
		- Define ‘common SMTC occasion’ when two or more bands have the SCells being activated and active serving cells in the same band as follow.
			* there for K SCells being activated exists a set of non-zero integers N1, ..., NK and a value X fulfilling the following:
			* SMTC offset#m + Nm×SMTC period#m = X, for m=1,...,K, where SMTC offset#m and SMTC period#m are SMTC offset and SMTC period, respectively, for the m-th Scell in the set of K SCells to be activated.
		- When only one band has the SCell being activated and the active serving cell(s) in the same band, the RF retuning occasion shall base on the SCell(s) which has active serving cells in the same band.
		- When common SMTC occasion exists for all SCells being activated and more than one band has the SCell being activated and the active serving cell(s) in the same band, the RF retuning occasion shall base on the common SMTC occasion for all SCells being activated.
		- When common SMTC occasion non-exists for SCells being activated and more than band has the SCell(s) being activated and active serving cell(s) in the same band, the performance degradation for active serving cells which are in the same band with latter SCells being activated is expected. RAN4 should further enhance this scenario in the latter release.
	+ Option 2 (Huawei):
		- If SMTC offset is different among
			* SCells in different bands activated by the same MAC CE if UE does not support per FR gap, or
			* SCells in different FR1 bands activated by the same MAC CE if UE supports per FR gap,
		- for activated FR1 serving cells in the same band as an unknown to-be-activated SCell, there may be more interruption than allowed in clause 8.2 due to multiple SCell activation.
* Recommended WF
	+ TBA.
* 1st round Comment collection:

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Apple | We acknowledge the observation from Ericsson that the issue cannot be addressed by aligning the SMTC offset only. But option 2 might be an easier way compared with option 1. Our suggestion is to revise option 2 to a new option that (wording could be further discussed):* + Option 3 (Apple):
		- Upon receiving SCell activation command in slot *n, i*f the closest SMTC after *n*+THARQ+3ms is not aligned on time domain among
			* SCells in different bands activated by the same MAC CE if UE does not support per FR gap, or
			* SCells in different FR1 bands activated by the same MAC CE if UE supports per FR gap,
			* At least one target SCell which needs AGC estimation is in the same band as an active serving cell
		- The multiple SCell activation and corresponding interruption requirement cannot apply.
 |
| Qualcomm | We also acknowledge the observation provided in Ericsson contribution. But we are not sure if all those cases need to be explicitly addressed in requirement spec given that UE performance degradation for those cases is anyway not going to be evaluated in certification tests. Besides, if the change is effectively to extend the activation latency, we’re wondering if there won’t any unwanted side effect, e.g. latency, UE power consumption, etc.Option 3 is okay with us in principle, if it’s acceptable to Ericsson. |
| MTK | We also acknowledge the observation provided in Ericsson contribution. But on the 1st bullet, we prefer simpler wording e.g. the earliest occasion that SMTC occasions of K SCells being activated occurs. On Opion 2, for known SCell measurement cycle > 160 ms, AGC is also needed, and multiple interruption should be allowed.Option 3 is ok for us.  |
| Huawei | We also acknowledge the observation provided in Ericsson contribution. If we understand correctly, with option 1 Ericsson proposes that UE may delay the RF re-tuning for multiple SCell activation, e.g. based on SSB of SCell which has active serving cell in the same band instead of earliest SSB among all the SCells. We are not sure if this is a good approach. The interruption due to AGC issue will not always happen, so to avoid the possible interruption at the cost of increased delay may not be desirable. Also this introduces new UE behavior to determine when to re-tune RF, and we do not prefer such as change at this late stage especially considering the increased UE complexity. On option 3 from Apple, we are in general fine, but we also have some comments1. Instead of closest SMTC, we should use close SSB\_MAX, because AGC is based on common SSB among to-be activated SCell and active serving cell in a band.
2. We can be more specific on “target SCell which needs AGC estimation”. In our view, it means cases where TFirstSSB\_MAX is involved in the requirements considering MTK comments above. Also we only need to consider FR1 as commented by Ericsson and Nokia in last meeting.
3. Instead of saying “requirement cannot apply”, maybe we can see “there may be more interruption than allowed”. This was commented by Nokia in last meeting, that we should not restrict the application of the requirements because of the possible interruption.

Based on above comments, we propose option 4 which combines option 2 and option 3.* + Option 4 (HW):
		- Upon receiving SCell activation command in slot *n,* if the closest SSB\_MAX after *n*+THARQ+3ms is not aligned on time domain among
			* SCells in different bands activated by the same MAC CE if UE does not support per FR gap, or
			* SCells in different FR1 bands activated by the same MAC CE if UE supports per FR gap,
		- If for a to-be-activated SCell the activation requirements involves TFirstSSB\_MAX, for activated FR1 serving cells in the same band there may be more interruption than allowed in clause 8.2

Hope it could be an agreeable compromise for this issue. |
| Nokia | We may work forward either using option 3 as proposed by Apple, although the last line ‘The multiple SCell activation and corresponding interruption requirement cannot apply’ does not seems reasonable. Instead we would prefer “the UE may cause additional interrupts”. Huawei’s proposal in Option 4 sounds better. Additionally, there may be a need for further refinement of the wording e.g. that this only applies for FR1 case. Alternative is not to define requirements on this detailed level. |
| Ericsson | Firstly, from network’s view, the UE’s behaviour shall be clearly defined. Otherwise, network doesn’t have the confidence to schedule the active serving cells during the activation procedure.This will result in additional system performance loss, especially for the UEs which don’t have too much impact on this AGC issue.Secondly, RAN4 already had the agreement to only permit one interruption occasion in multiple SCell activation in #95 meeting. Our proposal option 1 is a compromise solution to permit longer delay for some SCells to avoid the additional performance degradation from active serving cells.When we checked all UE vendors’ comments, we agree that our proposal will introduce some new UE behvaiours, and it may be hard for some UEs to change the design in current stage for Rel-16.Thus, as a further compromise, we suggest to allow multiple interruptions in Rel-16, but the scenario, duration and occasion for the interruption shall be clearly defined. We suggest to update HW’s option 4 to clearly capture the interruption as follow.* Option 5(Ericsson):
	+ Upon receiving SCell activation command in slot *n,* if the TFirstSSB\_MAX in different bands which have SCells being activated after *n*+THARQ+3ms are not aligned on time domain among
		- SCells in different bands being activated by the same MAC CE if UE does not support per FR gap, or
		- SCells in different FR1 bands being activated by the same MAC CE if UE supports per FR gap.
	+ Multiple interruptions may be expected for the activated serving cells.
		- The number of interruptions cannot be larger than the number of FR1 bands which have both SCells requiring AGC retuning and the active serving cell.
		- In each interruption occasion, the interruption length X2 is defined in clause 8.2.2.2.2.
	+ However, when the following conditions are fulfilled, there is no additional interruption is expected.
		- all SCells being activated are on FR2, or
		- no additional AGC retuning is needed for all SCells being activated, or
		- no active serving cell(s) in the same band with the SCells being activated which require AGC retuning
 |

## Companies views’ collection for 1st round

### Open issues

Comments are collected in section 1.2

### CRs/TPs comments collection

*Major close-to-finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going Wis, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| [R4-2109523](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109524.zip)(CMCC CR) | Nokia: R4-2109523 and R4-2109883 should likely be merged. Once a merged version is available final evaluation can be given. But in general the proposed correction looks agreeable. |
| Ericsson: CR is OK |
|  |
| [R4-2109883](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109883.zip)(MTK CR) | Nokia: R4-2109523 and R4-2109883 should likely be merged. Once a merged version is available final evaluation can be given. But in general the proposed correction looks agreeable. |
| Ericsson: CR is OK |
|  |
| [R4-2109989](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109989.zip)(Ericsson CR) | Apple: according to conclusion in issue 1-2 |
| Nokia: This depends on the conclusion in Issue 1-2. |
|  |
| [R4-2110901](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110901.zip)(HW CR) | Apple: according to conclusion in issue 1-2 |
| Nokia: This depends on the conclusion in Issue 1-2. |
|  |
| R4-2109984(Ericsson CR, endorsed in RAN4 #98bise) | Apple: agree |
| Company B |
|  |
| R4-2110898(HW CR, endorsed in RAN4 #98bise) | Apple: agree |
| Ericsson: CR is OK |
|  |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provides recommendation on CRs/TPs Status update*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation**  |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation**  |
| XXX | *Based on 2nd round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

# Topic #2: Performance maintenance (5.1.3.2.2.2/5/7/9)

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

## Companies’ contributions summary

|  |  |  |  |
| --- | --- | --- | --- |
| **T-doc number** | **Title** | **Company** | **Proposals / Observations** |
| [**R4-2110289**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110289.zip) | CR on maintaining SCell activation and deactication delay test for FR2 inter-band CA R16 | Huawei, HiSilicon | To remove the square brackets in SCell activation and deactication delay test for FR2 inter-band CA. |
| R4-2110290 | CR on maintaining SCell activation and deactication delay test for FR2 inter-band CA R17 | Huawei, HiSilicon |  |

## Open issues summary

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

### Sub-topic 1-1: Inter-frequency measurement without MG

*Sub-topic description:*

*Open issues and candidate options before e-meeting:*

## Companies views’ collection for 1st round

### Open issues

Comments are collected in section 2.2

### CRs/TPs comments collection

*Major close-to-finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going Wis, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| [R4-2110289](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110289.zip)(HW’s CR) | Apple: fine |
| MTK: fine |
| Ericsson: CR is OK |
| R4-2110290(Cat-A) | Company A |
| Company B |
|  |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provides recommendation on CRs/TPs Status update*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation**  |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation**  |
| XXX | *Based on 2nd round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

# Recommendations for Tdocs

## 1st round

**New tdocs**

|  |  |  |
| --- | --- | --- |
| **Title** | **Source** | **Comments** |
|  |  |  |
|  |  |  |
|  |  |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation**  | **Comments** |
| R4-210xxxx | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics incl. existing and new tdocs.
2. For the Recommendation column please include one of the following:
	1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
	2. Other documents: Agreeable, Revised, Noted
3. For new LS documents, please include information on To/Cc WGs in the comments column
4. Do not include hyper-links in the documents

## 2nd round

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation**  | **Comments** |
|  |  |  |  |  |
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Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics.
2. For the Recommendation column please include one of the following:
	1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
	2. Other documents: Agreeable, Revised, Noted
3. Do not include hyper-links in the documents