**3GPP TSG-RAN WG4 Meeting # 99-e R4-2108167**

**Electronic Meeting, 19th – 27th May 2021**

**Agenda item:** 5.1.2.2 & 5.1.2

**Source:** Moderator (CATT)

**Title:** Email discussion summary for [99-e][243] NR\_UE\_pow\_sav\_RRM

**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.*

This document is the summary of the email discussion for Rel-16 NR UE Power saving RRM requirement in agenda items 5.1.2.2 & 5.1.2, with the email thread “[99-e][243] NR\_UE\_pow\_sav\_RRM”.

The targets of email discussion for 1st round and 2nd round are listed as below:

* 1st round
	+ Discuss the open issues and try to reach an agreement.
	+ Review CRs/draft LS to collect comments
* 2nd round
	+ Finalize the open issues and check if revised CRs can be agreeable.

# Topic #1: RRM core requirements maintenance

*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** |
| R4-2109073 | CATT | Draft LS on RRM relaxation in power saving |
| R4-2109844 | vivo | **Observation 1: The 1 hour time interval is used as an absolute value and not scaled at section 4.2.2.10.4 and 4.2.2.11.4 at TS38.133 and section 5.2.4.9.0 at TS38.304. The 1 hour time interval is scaled by the number of frequency layers at 4.2.2.10.2 and 4.2.2.11.2 at TS38.133. The initial discussion on this time interval does not mention anything related to scaling, based on [4].****Proposal 1: Use option 1, i.e., change K2\*Thigher\_priority\_search to 1 hour to solve this misalignment issue within RAN4 spec and between RAN4 and RAN2 specs.** |
| R4-2109845 | vivo | CR for removing scaling factor K2 for R16 UE power saving |
| R4-2109846(Cat-A CR of R4-2109845) | vivo | CR for removing scaling factor K2 for R16 UE power saving |
| R4-2110361 | Huawei,HiSilicon | **Proposal1: When Srxlev ≤ SnonIntraSearchP or Squal ≤ SnonIntraSearchQ, measurements for UE fulfilling low mobility or not-at-cell edge criteria UE are specified as Ncarrier\_Relax \* Trelax + Ncarrier\_Non\_relax \* Tnon-Relax** **where** **Trelax is the relaxed measurement requirements specified in clause 4.2.2.10 and 4.2.2.11 in TS38.133,****Tnon-Relax is the normal measurement requirements specified in clause 4.2.2.4 and 4.2.2.5 in TS38.133,****Ncarrier\_Relax is the total number of configured inter-frequency/inter-RAT carriers required to meet relaxed measurement requirements (i.e., non-EMR carriers and EMR carriers while T331 is not running).****Ncarrier\_Relax is the total number of configured inter-frequency/inter-RAT carriers required to meet non relaxed measurement requirements (i.e., EMR carriers while T331 is running).** |
| R4-2110362 | Huawei,HiSilicon | Correction on measurement requirements in relaxed measurement |
| R4-2110363(Cat-A CR of R4-2110362) | Huawei,HiSilicon | Correction on measurement requirements in relaxed measurement |
| R4-2111241 | Ericsson | **Proposal #1:** RAN4 shall maintain the existing requirements defined in TS 38.133 on higher priority carriers.**Proposal #2:** RAN4 sends an LS to RAN2 asking them to align RAN2 specifications with the existing requirements defined in TS 38.133 on higher priority carriers.**“LS on relaxation requirements for higher priority carriers” in Appendix** |

## 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

*Sub-topic description:*

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

**Issue 1-1: When Srxlev > SnonIntraSearchP and Squal > SnonIntraSearchQ and the UE is configured with *highPriorityMeasRelax* [2] then the UE shall search for inter-frequency layers (E-UTRA inter-RAT frequency layers) of higher priority at least every K2\*Thigher\_priority\_search where Thigher\_priority\_search is described in clause 4.2.2.7 and, K2 = 60. Whether to change “K2\* Thigher\_priority\_search” to “1 hour” directly?**

* Proposals
	+ Option 1: Yes. Accept the proposal in R4-2109845. Change it to “1 hour” (vivo)
	+ Option 2: No. Keep the existing requirements defined in TS38.133 and RAN4 sends an LS to RAN2 (CATT, Ericsson)
* Recommended WF
	+ TBA

**Issue 1-2: For inter-frequency/inter-RAT measurement, whether to specify the requirements when there are both non-relaxed measurement carriers and relaxed measurement carriers?**

* Proposals
	+ Option 1: Yes. (Huawei)

When Srxlev ≤ SnonIntraSearchP or Squal ≤ SnonIntraSearchQ, measurements for UE fulfilling low mobility or not-at-cell edge criteria UE are specified as Ncarrier\_Relax \* Trelax + Ncarrier\_Non\_relax \* Tnon-Relax

where

Trelax is the relaxed measurement requirements specified in clause 4.2.2.10 and 4.2.2.11 in TS38.133,

Tnon-Relax is the normal measurement requirements specified in clause 4.2.2.4 and 4.2.2.5 in TS38.133,

Ncarrier\_Relax is the total number of configured inter-frequency/inter-RAT carriers required to meet relaxed measurement requirements (i.e., non-EMR carriers and EMR carriers while T331 is not running).

Ncarrier\_Relax is the total number of configured inter-frequency/inter-RAT carriers required to meet non relaxed measurement requirements (i.e., EMR carriers while T331 is running).

The accompany CR is in R4-2110362.

* + Option 2: No.
* Recommended WF
	+ TBA

## Companies views’ collection for 1st round

### Open issues

*One of the two formats, i.e. either example 1 or 2 can be used by moderators.*

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| --- | --- |
| **Company** | **Comments** |
| Huawei | Issue 1-1: support option1. 1 hour is sufficiently long. If 1 hour scaling with Nlayer, then UE shall search every layer of higher priority at least every Thigher\_priority\_search = 1hour \* Nlayers. Although the UE speed is low and not at cell edge, the mobile phone also has possibility to move. Several hours without searching may have risk.Issue 1-2. Support option 1.**Motivation:** It is agreed in the approved WF [R4-2009265] that measurements on EMR carriers should not be relaxed if T331 is running. The EMR measurement on inter-frequency carriers shall follow the (non-relaxed requirements when T331 is running.If a UE is configured with both EMR measurement carriers (T331 is running) and mobility measurement carriers. When Srxlev ≤ SnonIntraSearchP or Squal ≤ SnonIntraSearchQ the UE fulfills relaxed measurement criterion (either low mobility or not-at-cell edge criteria), how to define the measurement requirements when there are both non-relaxed measurement carriers and relaxed measurement carriers?**Solutions**: In R16 HST inter-RAT idle mode measurement, there are NEUTRA\_carrier andNEUTRA\_carrier\_HST.They represent respectively the E-UTRA carriers indicated to meet **non** high speed requirements and E-UTRA carriers indicated to meet high speed requirements.We suggest the similar principle can be inherit for relaxation measurement. |
| Ericsson | **Issue 1-1:** We support option 2. We prefer to keep the existing requirements defined in TS38.133 and RAN4 sends an LS to RAN2 to update their specification to address the mismatch. We don’t think it is the right time to reopen the discussion and agreement. **Issue 1-2:** We support option 2. No need to address this issue under maintenance. Only essential corrections should be done, not to introduce new scenarios under maintenance for which RAN4 shall define requirements.  |
| Huawei (2) |  **Issue 1-2:** To Ericsson. This is an essential issue and is not a new scenario. This issue shall be resolved, otherwise UE will not satisfy the current requirements when there are both EMR measurement carriers (T331 is running) and mobility measurement carriers in network.We’d like to clarify the issue again:It is agreed in the approved WF [R4-2009265] that measurements on EMR carriers should not be relaxed if T331 is running. If a UE is configured with both EMR measurement carriers (T331 is running) and mobility measurement carriers. When Srxlev ≤ SnonIntraSearchP or Squal ≤ SnonIntraSearchQ and UE fulfills relaxed measurement criterion (either low mobility or not-at-cell edge criteria), how to define the measurement requirements when there are both non-relaxed measurement carriers and relaxed measurement carriers? The CR is trying to solve the question. |
| CATT | **Issue 1-1****We support option 2. There is misalignment between RAN2 and RAN4. This should be specified in RAN4. We prefer to keep the existing RAN4 spec and send LS to RAN2 to indicate the misalignment.** **Issue 1-2****For the inter-frequency measurement and inter-RAT measurement, we think the issue exists for all carriers when some carriers can be relaxed while other carriers cannot.**  |
| vivo | **Issue 1-1**Support option 1. 1 hour is already quite long. In addition besides the confliction with RAN2’s spec, there are contradiction parts even within RAN4 spec which could be addressed by option 1. **Issue 1-2**We understand the motivation of the proposal and we think this is an issue should be addressed.  |

### CRs/TPs comments collection

*For close-to-finalize WIs and maintenance work, comments collections can be arranged for TPs and CRs. For ongoing WIs, suggest to focus on open issues discussion on 1st round.*

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| **CR/TP number** | **Comments collection** |
| R4-2109845(vivo) | Ericsson: We prefer to keep the existing requirements defined in TS38.133 and RAN4 sends an LS to RAN2 to update their specification to address the mismatch. Thus this CR is not agreeable to us. |
| CATT: It is Issue 1-1. Our proposal is to keep the existing requirements and send LS to RAN2.  |
|  |
| R4-2110362(Huawei,HiSilicon) | Ericsson: No need to address this issue under maintenance. Only essential corrections should be done, not introduce new scenarios for which RAN4 shall define requirements. Thus this CR is not agreeable to us. |
| Company B |
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## 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.*

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|  | **Status summary**  |
| **Sub-topic #1** | *Tentative agreements:**Candidate options:**Recommendations for 2nd round:* |
| **Issue 1-1: When Srxlev > SnonIntraSearchP and Squal > SnonIntraSearchQ and the UE is configured with *highPriorityMeasRelax* [2] then the UE shall search for inter-frequency layers (E-UTRA inter-RAT frequency layers) of higher priority at least every K2\*Thigher\_priority\_search where Thigher\_priority\_search is described in clause 4.2.2.7 and, K2 = 60. Whether to change “K2\* Thigher\_priority\_search” to “1 hour” directly?** | The following options were discussed. * Option 1: Yes. Accept the proposal in R4-2109845. Change it to “1 hour” (vivo)
* Option 2: No. Keep the existing requirements defined in TS38.133 and RAN4 sends an LS to RAN2 (CATT, Ericsson)

4 companies showed their views on this issue:* 2 companies support option 1 (Huawei, vivo)
* 2 companies support option 2 (CATT, Ericsson)

*Tentative agreements:**Recommendations for 2nd round:*Continue the discussion in 2nd round to check whether an agreement can be reached.In case of no consensus, it is proposed to follow the guidance from Session chair in RAN4#98-e meeting:Session chair: For issue “Whether to change “K2\* Thigher\_priority\_search” to “1 hour” in Slide 2, continue discussion in RAN4 #98-bis-e. If no consensus is reached to modify RAN4 specification, then LS to RAN2 shall be sent to inform on mismatch in RAN4 and RAN2 specs. |
| **Issue 1-2: For inter-frequency/inter-RAT measurement, whether to specify the requirements when there are both non-relaxed measurement carriers and relaxed measurement carriers?** | The following options were discussed.* Option 1: Yes. (Huawei)

When Srxlev ≤ SnonIntraSearchP or Squal ≤ SnonIntraSearchQ, measurements for UE fulfilling low mobility or not-at-cell edge criteria UE are specified as Ncarrier\_Relax \* Trelax + Ncarrier\_Non\_relax \* Tnon-Relax where Trelax is the relaxed measurement requirements specified in clause 4.2.2.10 and 4.2.2.11 in TS38.133,Tnon-Relax is the normal measurement requirements specified in clause 4.2.2.4 and 4.2.2.5 in TS38.133,Ncarrier\_Relax is the total number of configured inter-frequency/inter-RAT carriers required to meet relaxed measurement requirements (i.e., non-EMR carriers and EMR carriers while T331 is not running).Ncarrier\_Relax is the total number of configured inter-frequency/inter-RAT carriers required to meet non relaxed measurement requirements (i.e., EMR carriers while T331 is running).The accompany CR is in R4-2110362.* Option 2: No.

4 companies showed their views on this issue:* 3 companies support there is issue for inter-frequency measurement and inter-RAT measurement (Huawei, CATT, vivo)
* 1 companies support option 2 (Ericsson)

*Tentative agreements: No**Recommendations for 2nd round:*Need further discussion in 2nd round. The issue can be discussed as two parts:**Issue 1-2-1: For inter-frequency/inter-RAT measurement when there are both non-relaxed measurement carriers and relaxed measurement carriers, Do you agree there is issue in current spec?*** Option 1: Yes
* Option 2: No

**Issue 1-2-2: If Yes in Issue 1-2-1, how to resolve it?*** Option 1: Agree the CR (R4-2110362)
* Option 2: Propose other solution
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### CRs/TPs

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

*Note: The tdoc decisions shall be provided in Section 3 and this table is optional in case moderators would like to provide additional information.*

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| **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”* |
| R4-2109845(vivo) | It depends on the outcome of Issue 1-1. |
| R4-2110362(Huawei,HiSilicon) | It depends on the outcome of Issue 1-2. |

## Discussion on 2nd round (if applicable)

**Issue 1-1: When Srxlev > SnonIntraSearchP and Squal > SnonIntraSearchQ and the UE is configured with *highPriorityMeasRelax* [2] then the UE shall search for inter-frequency layers (E-UTRA inter-RAT frequency layers) of higher priority at least every K2\*Thigher\_priority\_search where Thigher\_priority\_search is described in clause 4.2.2.7 and, K2 = 60. Whether to change “K2\* Thigher\_priority\_search” to “1 hour” directly?**

* Proposals
	+ Option 1: Yes. Accept the proposal in R4-2109845. Change it to “1 hour” (Huawei, vivo)
	+ Option 2: No. Keep the existing requirements defined in TS38.133 and RAN4 sends an LS to RAN2 (CATT, Ericsson)

**Issue 1-2-1: For inter-frequency/inter-RAT measurement when there are both non-relaxed measurement carriers and relaxed measurement carriers, do you agree there is issue in current spec?**

* Option 1: Yes
* Option 2: No

**Issue 1-2-2: If Yes in Issue 1-2-1, how to resolve it?**

* Option 1: Agree the CR (R4-2110362)
* Option 2: Propose other solution

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| --- | --- |
| **Company** | **Comments** |
| Qualcomm | **Issue 1-1:**Support option 1, ‘1 hour’ should provide sufficient relaxation and we do not see a reason to increase it further by the number of layers;**Issue 1-2-1:**It is not clear whether the UE is allowed to relax on non-EMR carriers in the scenario under discussion, but this CR would introduce a new requirement that hasn’t been discussed before and requires further discussion. Is there a test designed for this case? If not, what would be the goal of this new requirement? |
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### CRs/TPs comments collection in 2nd round

*For close-to-finalize WIs and maintenance work, comments collections can be arranged for TPs and CRs. For ongoing WIs, suggest to focus on open issues discussion on 1st round.*

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| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2109845(vivo) | Qualcomm: Support the CR |
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| R4-2110362(Huawei,HiSilicon) | Qualcomm: this requires further discussions (see Issue 1-2-1). |
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# Topic #2: Test case maintenance

*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** |
| R4-2109071 | CATT | Correction to cell reselection test case for UE Power saving |
| R4-2109072(Cat-A CR) | CATT | Correction to cell reselection test case for UE Power saving |
| R4-2111241 | Ericsson | **Proposal #3**: RAN4 shall follow the release 15 approach in defining the FR2 inter-frequency test cases and shall not consider UE gain factor G.  |
| R4-2111240 | Ericsson | Changes to cell reselection tests under power saving |
| R4-2111239(Cat-A CR) | Ericsson | Changes to cell reselection tests under power saving |

## 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 2-1

*Sub-topic description:*

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

**Issue 2-1: Whether to consider UE gain G for two test cases of FR2 inter-frequency measurement?**

* Proposals
	+ Option 1: No. Follow the release 15 approach in defining the FR2 inter-frequency test cases and shall not consider UE gain factor G
	+ Option 2: Yes.
* Recommended WF
	+ TBA

## Companies views’ collection for 1st round

### Open issues

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| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 1-1: Sub topic 1-2:….Others: |
| Ericsson | **Issue 2-1:**We prefer to follow the release 15 approach in defining the FR2 inter-frequency test cases and shall not consider UE gain factor G. |
| CATT | **Issue 2-1:****The UE gain G for FR2 inter-frequency is not introduced by power saving. It is common issue. So we are fine to not solve it in power saving. It can be solved in R15 cell reselection case firstly then we follow the same principle.**  |
| MediaTek | Issue 2-1:Support option 2. In our understanding, the impact of UE gain G will lead to large accurate uncertainty on measurement. We should confirm the test case is testable before we define the test case. Otherwise, we should not introduce this test case in performance part. |
| vivo | Issue 2-1We agree with CATT’s comments that if it is justified, it is a general issue and all related cases should be considered.  |

### 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** |
| R4-2109071(CATT) | Ericsson: Agreeable to us. |
|  vivo: we wonder to know why T1, T2 is not big enough since the value of T1, T2 have already considered some margins.  |
| CATT: answer to vivo: because TSearchDeltaP is 5s. It cannot be zero as definition in 38.331. 5s+relaxed cell re-selection delay (17s) is larger than 20s.  |
| R4-2111240(Ericsson) | CATT:First TC: TSearchDeltaP is huge and the final time is not aligned with it. Second TC: SSearchDeltaP and TSearchDeltaP should not be applied for not-cell edge criterion but SsearchThresholdP. Thigher\_priority\_search should not be included according to the agreement in meeting before.  |
| 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.*

|  |  |
| --- | --- |
|  | **Status summary**  |
| **Sub-topic#1** | *Tentative agreements:**Candidate options:**Recommendations for 2nd round:* |
| **Issue 2-1: Whether to consider UE gain G for two test cases of FR2 inter-frequency measurement?** | The following options were discussed. * Option 1: No. Follow the release 15 approach in defining the FR2 inter-frequency test cases and shall not consider UE gain factor G
* Option 2: Yes.

4 companies showed their views on this issue:* 3 companies support option 1 (Ericsson, CATT, vivo)
* 1 companies support option 2 (MTK)

*Tentative agreements:**Recommendations for 2nd round:*Since it is not the issue in power saving, the testable is the same in R15. So is option 1 agreeable? |

### CRs/TPs

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

|  |  |
| --- | --- |
| **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”* |
| R4-2109071(CATT) | Agreeable. |
| R4-2111240(Ericsson) | To be revised. |

## Discussion on 2nd round (if applicable)

*Moderator can provide summary of 2nd round here. Note that recommended decisions on tdocs should be provided in the section titled ”Recommendations for Tdocs”.*

**Issue 2-1: Whether to consider UE gain G for two test cases of FR2 inter-frequency measurement?**

* Proposals
	+ Option 1: No. Follow the release 15 approach in defining the FR2 inter-frequency test cases and shall not consider UE gain factor G
	+ Option 2: Yes.
* Recommended WF
	+ Since it is not the issue in power saving, the testable consideration is the same in R15. So is option 1 agreeable?

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| --- | --- |
| **Company** | **Comments** |
| Qualcomm | Support the WF |
|  |  |

### 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.*

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| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2108231 (revised from R4-2111240)(Ericsson) |  |
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# Recommendations for Tdocs

## 1st round

**New tdocs**

|  |  |  |
| --- | --- | --- |
| **Title** | **Source** | **Comments** |
| LS on RRM relaxation in power saving | CATT, Ericsson | To: RAN2 |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation**  | **Comments** |
| R4-210xxxx | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
| R4-2109845 | CR for removing scaling factor K2 for R16 UE power saving | vivo | Return to |  |
| R4-2109846(Cat-A) | CR for removing scaling factor K2 for R16 UE power saving | vivo |  |  |
| R4-2110362 | Correction on measurement requiements in relaxed measurement | Huawei,HiSilicon | Return to |  |
| R4-2110363(Cat-A) | Correction on measurement requiements in relaxed measurement | Huawei,HiSilicon |  |  |
| R4-2109071 | Correction to cell reselection test case for UE Power saving | CATT | Agreeable |  |
| R4-2109072(Cat-A) | Correction to cell reselection test case for UE Power saving | CATT |  |  |
| R4-2111240 | Changes to cell reselection tests under power saving | Ericsson | To be revised |  |
| R4-2111239(Cat-A) | Changes to cell reselection tests under power saving | Ericsson |  |  |
| R4-2109073 | Draft LS on RRM relaxation in power saving | CATT | To be noted.  |  |
| R4-2111241 | LS on relaxed requirements for higher priority carriers | Ericsson | To be noted.  |  |

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** |
| R4-210xxxx | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
| R4-210xxxx | WF on … | YYY | Agreeable, Revised, Noted |  |
| R4-210xxxx | LS on … | ZZZ | Agreeable, Revised, Noted |  |
|  |  |  |  |  |

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