**3GPP TSG-RAN4 Meeting #97-e R4-20XXXXX**

**Electronic Meeting, 2 – 13 Nov., 2020**

**Agenda item:** 7.13

**Source:** Moderator (Apple)

**Title:** Email discussion summary for [96e][220] NR\_RRM\_Enh\_RRM\_3

**Document for:** Information

# Introduction

This email discussion summary includes Inter-band CA requirement for FR2 UE measurement capability of independent Rx beam and/or common beam (7.13.1.5), relevant papers of “multiple SCell activation/deactivation, inter-frequency measurements without MG, and UE-specific BW change” (7.13.1.6), and test cases of “Multiple Scell activation/deactivation” (7.13.2.2.2), “Inter-frequency measurement requirement without MG”(7.13.2.2.5), “ UE-specific CBW change”(7.13.2.2.7) and “Inter-band CA requirement for FR2 UE measurement capability of independent Rx beam”(7.13.2.2.9).

Candidate target of email discussion for 1st round and 2nd round

* 1st round:
	+ Stage 0: Session chairs announce the set of email threads (no later than Monday 8am UTC, Nov. 2)
	+ Stage 1: Moderators kick off email discussion (Monday Nov. 2)
	+ Stage 2: Companies provide comments for the 1st round (Nov. 2 – Wednesday 6pm UTC Nov. 4)
	+ Stage 3: Moderators summarize the status and possible proposals, recommending what decisions can be made for 1st round. A formal t-doc will be used (Thursday 6pm UTC, Nov. 5)
	+ Stage 4: After receiving the summary from moderators, session chair may approve documents, make agreements or assign new CRs, WFs, LSs, etc. (no later than Monday 8am UTC, Nov. 9)
* 2nd round:
	+ Stage 5: Companies provide comments for 2nd round.
		- Draft WF/LS and revised CRs/TPs shall be shared by Wednesday 1am UTC, Nov. 11.
		- Commenting shall stop by Wednesday 11pm UTC, Nov. 11.
		- Formal tdocs of WF/LS/CRs/TPs shall be uploaded to the Inbox (except Cat A CRs) by Thursday 1am UTC, Nov. 12.
		- Draft moderator summary shall be shared by Thursday 9am UTC, Nov. 12, but moderators are strongly encouraged to share it earlier if possible and delegates to comment as early as possible.
	+ Stage 6: Moderators provide 2nd round summary with a formal tdoc by Thursday 6pm UTC, Nov. 12.
	+ Stage 7: Session chairs announce close of sessions (no later than 6pm UTC, Nov. 13). Final decisions will be captured in Chairman meeting report (to be shared after the meeting is closed)

# Topic #1: Inter-band CA requirement for FR2 UE measurement capability of independent Rx beam and/or common beam (7.13.1.5)

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2014275 | Apple | Clean up the CBM specific RRM requirement in TS38.133. |
| R4-2014873 | MediaTek inc. | Proposal 1: Not necessary to specify the requirements for ‘SCell being activated belongs to FR2 and there is an active serving cell on that FR2 band and the PCell or PSCell is in FR2 and the PCell or PSCell and SCell being activated are in a band pair with independent beam management’. |
| R4-2014874 | MediaTek inc. | Clarify the requiremrent is also applicable for “if the PCell/PSCell and the target SCell are with FR1-FR2 CA. |
| R4-2015309 | NTT DOCOMO, INC. | Proposal 1: Additional requirement for the remaining issue is not needed.Tentative agreement FFS:SCell activation delay requirements for IBM UE* Not necessary to specify the requirements for ‘SCell being activated belongs to FR2 and there is an active serving cell on that FR2 band and the PCell or PSCell is in FR2 and the PCell or PSCell and SCell being activated are in a band pair with independent beam management’
 |
| R4-2015985 | Intel Corporation | Following changes are introduced: into TS 38.133:* To move to a separate clause the clarification of condition of measurement restriction requirements for RLM in CA scenario.
* To move to a separate clause the clarification of condition of measurement restriction requirements for BFD in CA scenario
* To move to a separate clause the clarification of condition of measurement restriction requirements for CBD in CA scenario
* To move to a separate clause the clarification of condition of measurement restriction requirements for L1-RSRP measurements in CA scenario
* To move to a separate clause the clarification of condition of measurement restriction requirements for L1-SINR measurements in CA scenario
 |
| R4-2016576 | Qualcomm Incorporated | **Proposal 1: RAN4 to revisit the previous agreements “*Beam management resources on one cell in each band may be configured*” and “*Network may also configure beam management resources only on one cell such as Pcell, e.g. if network knows nodes on both bands are collocated*” and update them as follows:*** IBM UEs shall be able to add/configure/activate cells on both FR2 inter-band CCs only when beam management resources are configured in the both bands irrespective of network deployment, e.g. collocated vs. non-collocated.
 |

## 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 SCell activation requirement for FR2 FR2 inter-band CA

*Sub-topic description:*

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

**Issue 1-1: Necessity of SCell activation requirement with existing serving cell on same FR2 band**

* Proposals (MTK, NTT DOCOMO)
	+ Not necessary to specify the requirements for ‘SCell being activated belongs to FR2 and there is an active serving cell on that FR2 band and the PCell or PSCell is in FR2 and the PCell or PSCell and SCell being activated are in a band pair with independent beam management’.
* Recommended WF
	+ Agreement: Not necessary to specify the requirements for ‘SCell being activated belongs to FR2 and there is an active serving cell on that FR2 band and the PCell or PSCell is in FR2 and the PCell or PSCell and SCell being activated are in a band pair with independent beam management’

### Sub-topic 1-2 Beam management resources for IBM UE

*Sub-topic description:*

In WF R4-2005353 (RAN4 #94bis-e), it was agreed that,

Beam management resource configuration for FR2 inter-band CA combination with independent beam:

* Beam management resources on one cell in each band may be configured.
* Network may also configure beam management resources only on one cell such as Pcell, e.g. if network knows nodes on both bands are collocated.

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

**Issue 1-2: Beam management resources for IBM UE**

* Proposals (QC):

RAN4 to revisit the previous agreements “*Beam management resources on one cell in each band may be configured*” and “*Network may also configure beam management resources only on one cell such as Pcell, e.g. if network knows nodes on both bands are collocated*” and update them as follows:

* + IBM UEs shall be able to add/configure/activate cells on both FR2 inter-band CCs only when beam management resources are configured in the both bands irrespective of network deployment, e.g. collocated vs. non-collocated.
* Recommended WF
	+ Agreement: IBM UEs shall be able to add/configure/activate cells on both FR2 inter-band CCs only when beam management resources are configured in the both bands irrespective of network deployment, e.g. collocated vs. non-collocated

## Companies views’ collection for 1st round

### Open issues

**Issue 1-1: Necessity of SCell activation requirement with existing serving cell on same FR2 band**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |
| YYY |  |

**Issue 1-2: Beam management resources for IBM UE**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |
| YYY |  |

### 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** |
| R4-2014275 (Apple CR) | Company A |
| Company B |
|  |
| R4-2014874 (MTK CR) | Company A |
| Company B |
|  |
| R4-2015985 (Intel CR) | 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.*

|  |  |
| --- | --- |
|  | **Status summary**  |
| **Sub-topic#1** | *Tentative agreements:**Candidate options:**Recommendations for 2nd round:* |

*Recommendations on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title**  | **Assigned Company,****WF or LS lead** |
| #1 |  |  |

### 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: Multiple SCell activation/deactivation miantenance (7.13.1.6)

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2014772 | MediaTek inc. | Observation 1: If network cannot guarantee transmitting the same Tx beam at the same time for different SCell(s) being activated, the timing difference between each SCell will result in additional interference on UE’s receiver.Observation 2: If network cannot guarantee transmitting the same Tx beam at the same time for different SCell(s) being activated, the UE’s AGC re-tuning will face big problem in intra-band. Proposal 1: The network should guarantee the transmitted signals from Scells have the same downlink spatial domain transmission filter on one OFDM symbol in intra-band FR1. |
| R4-2015771 | Huawei, HiSilicon | Proposal 1: Common Tx beam for FR1 intra-band contiguous CA should not be taken as a generic assumption for all RRM requirements.Proposal 2: Extend the UE requirement (to skip cell detection for unknown FR1 SCell that is intra-band contiguous to active serving cell) to single SCell activation.Proposal 3: No requirement apply for other SCells, if no requirements apply for any of the FR1 unknown SCell activated with the same MAC CE.Proposal 4: Multiple SCell activation requirements apply provided that SMTC offset is same for all SCells activated by the same MAC CE. |
| R4-2015772 | Huawei, HiSilicon | Based on 15771 |
| R4-2016019 | Ericsson | Introducing the following corrections:* Removing brackets from side condition, i.e., Ês/Iot ≥ -2dB
 |
| R4-2016574 | Qualcomm Incorporated | Proposal 1: RAN4 to revisit one of conditions for multiple SCell activation requirement for FR1 contiguous CA, and update it as follows:• Replace “its SSB DL Tx beam is same as the corresponding SSB DL Tx beam at the same SSB position of contiguous FR1 known cell or contiguous FR1 active serving cell” with “its MRTD with contiguous FR1 known cell or contiguous FR1 active serving cell is smaller than or equal to CP duration with respect to the to-be-activated SCell’s SSB numerology”• Replace “its SSB DL Tx beam is different as the corresponding SSB DL Tx beam at the same SSB position of contiguous FR1 known cell or contiguous FR1 active serving cell” with “its MRTD with contiguous FR1 known cell or contiguous FR1 active serving cell is larger than CP duration with respect to the to-be-activated SCell’s SSB numerology” |
| R4-2016583 | Qualcomm Incorporated | According to 16574 |

## 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 Tx beam assumption of FR1 intra-band contiguous CA

*Sub-topic description:*

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

**Issue 2-1: Tx beam assumption of FR1 intra-band contiguous CA**

* Option 1 (MTK): The network should guarantee the transmitted signals from Scells have the same downlink spatial domain transmission filter on one OFDM symbol in intra-band FR1.
* Option 2 (Huawei): Common Tx beam for FR1 intra-band contiguous CA should not be taken as a generic assumption for all RRM requirements
* Option 3 (Qualcomm): RAN4 to revisit one of conditions for multiple SCell activation requirement for FR1 contiguous CA, and update it as follows:
	+ Replace “its SSB DL Tx beam is same as the corresponding SSB DL Tx beam at the same SSB position of contiguous FR1 known cell or contiguous FR1 active serving cell” with “its MRTD with contiguous FR1 known cell or contiguous FR1 active serving cell is smaller than or equal to CP duration with respect to the to-be-activated SCell’s SSB numerology”
	+ Replace “its SSB DL Tx beam is different as the corresponding SSB DL Tx beam at the same SSB position of contiguous FR1 known cell or contiguous FR1 active serving cell” with “its MRTD with contiguous FR1 known cell or contiguous FR1 active serving cell is larger than CP duration with respect to the to-be-activated SCell’s SSB numerology”
* Recommended WF
	+ TBA

### Sub-topic 2-2 Maintenance of R16 FR1 SCell activation requirement

**Issue 2-2-1: Extend the assumption in FR1 multiple SCells activation to single FR1 SCell activation**

* Proposal (Huawei):
	+ Extend the UE requirement (to skip cell detection for unknown FR1 SCell that is intra-band contiguous to active serving cell) to single SCell activation.
* Recommended WF
	+ TBA

**Issue 2-2-2: Requirement applicability on the other being-activated SCells during the FR1 multiple SCells activation**

* Proposal (Huawei):
	+ No requirement apply for other being-activated SCells, if no requirements apply for any of the FR1 unknown SCell activated with the same MAC CE

Note: Moderator reworded the proposal by adding “being-activated”.

* Recommended WF
	+ TBA

**Issue 2-2-3: Condition of SMTC configuration to apply multiple SCell activation requirement**

* Proposal (Huawei):
	+ Multiple SCell activation requirements apply provided that SMTC offset is same for all SCells activated by the same MAC CE
* Recommended WF
	+ TBA

## Companies views’ collection for 1st round

### Open issues

**Issue 2-1: Tx beam assumption of FR1 intra-band contiguous CA**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |
| YYY |  |

**Issue 2-2-1: Extend the assumption in FR1 multiple SCells activation to single FR1 SCell activation**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |
| YYY |  |

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

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |
| YYY |  |

**Issue 2-2-3: Requirement applicability on the other being-activated SCells during the FR1 multiple SCells activation**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |
| YYY |  |

### 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** |
| R4-2015772 (Huawei CR) | Company A |
| Company B |
|  |
| R4-2016019 (Ericsson CR) | Company A |
| Company B |
|  |
| R4-2016583(Qualcomm CR) | 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.*

|  |  |
| --- | --- |
|  | **Status summary**  |
| **Sub-topic#1** | *Tentative agreements:**Candidate options:**Recommendations for 2nd round:* |

*Suggestion on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title**  | **Assigned Company,****WF or LS lead** |
| #1 |  |  |

### 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”* |

## 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 #3: Inter-frequency measurements without MG miantenance (7.13.1.6)

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2014364 | MediaTek inc. | Clarify that “if UE supports *interFrequencyMeas-NoGap-r16,* for inter-frequency measurement with no measurement gap, when all of the SMTC occasions of this inter-frequency measurement object are overlapped by the measurement gap, UE should follow the requirement in clause 9.3.4” |
| R4-2014861 | Apple | Editorial CR. |
| R4-2015496 | Huawei, HiSilicon | The power imbalance between serving frequency layer and inter-frequency layer on which UE performs without gap shall be within [6]dB. |

## 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 3-1 Power imbalance condition for inter-frequency without MG

*Sub-topic description:*

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

**Issue 3-1: Power imbalance condition for inter-frequency without MG**

* Proposal (Huawei): The power imbalance between serving frequency layer and inter-frequency layer on which UE performs without gap shall be within [6]dB
* Recommended WF
	+ TBA

## Companies views’ collection for 1st round

### Open issues

**Issue 3-1: Power imbalance condition for inter-frequency without MG**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |
| YYY |  |

### 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** |
| R4-2014364 (MTK CR) | Company A |
| Company B |
|  |
| R4-2014861 (Apple CR) | Company A |
| Company B |
|  |
| R4-2015496 (Huawei CR) | 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.*

|  |  |
| --- | --- |
|  | **Status summary**  |
| **Sub-topic#1** | *Tentative agreements:**Candidate options:**Recommendations for 2nd round:* |

*Suggestion on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title**  | **Assigned Company,****WF or LS lead** |
| #1 |  |  |

### 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”* |

## 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 #4: UE-specific CBW change maintenance (7.13.1.6)

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2014277 | Apple | Specify the UE behavior for Tx/Rx during CBW change delay. |
|  |  |  |

## 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 4-1 UE behavior for Tx/Rx during CBW change delay

*Sub-topic description:*

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

**Issue 4-1: Power imbalance condition for inter-frequency without MG**

* Proposal (Apple): The UE is not required to transmit UL signals or receive DL signals during the time defined by $\frac{T\_{RRCprocessingDelay}+T\_{CBWchangeDelayRRC}}{NR Slot length}$ on the cell where UE-specific CBW change occurs.
* Recommended WF
	+ TBA

## Companies views’ collection for 1st round

### Open issues

**Issue 4-1: Power imbalance condition for inter-frequency without MG**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |
| YYY |  |

### 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** |
| R4-2014277 (Apple CR) | Company A |
| Company B |
|  |
| YYY | 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.*

|  |  |
| --- | --- |
|  | **Status summary**  |
| **Sub-topic#1** | *Tentative agreements:**Candidate options:**Recommendations for 2nd round:* |

*Suggestion on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title**  | **Assigned Company,****WF or LS lead** |
| #1 |  |  |

### 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”* |

## 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 #5: TCs of Multiple Scell activation/deactivation (7.13.2.2.2)

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2014276 | Apple | * TC 1: EN-DC of LTE+FR1 NR without DRX with single MAC CE
	+ 2 FR1 unknown to-be-activated SCells, where
		- first FR1 unknown SCell is intra-band contiguous to active FR1 NR PSCell (meet the exception condition of N1 counting)
		- second FR1 unknown SCell is inter-band to active FR1 NR PSCell
 |
| R4-2014777 | Mediatek Inc. | * TC 3: NR-DC without DRX (test per-FR MG capable UE) with dual MAC CEs
	+ one inter-band FR1 unknown to-be-activated SCells + one FR2 unknown to-be-activated SCells with periodic CSI-RS for CSI reporting
 |
| R4-2015773 | Huawei, HiSilicon | * TC 2: EN-DC of LTE +FR1 NR (the existing activated serving cell) without DRX (test both per-FR MG capable UE and per-UE MG capable UE) with single MAC CE
	+ 1 FR2 known to-be-activated SCell and 1 FR2 unknown to-be-activated SCell
	+ Both to-be-activated SCells are configured with periodic CSI-RS for CSI reporting
 |

## 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 5-1

*Sub-topic description:*

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

## Companies views’ collection for 1st round

### Open issues

### 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** |
| R4-2014276 (Apple CR) | Company A |
| Company B |
|  |
| R4-2014777(MTK CR) | Company A |
| Company B |
|  |
| R4-2015773(Huawei CR) | 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.*

|  |  |
| --- | --- |
|  | **Status summary**  |
| **Sub-topic#1** | *Tentative agreements:**Candidate options:**Recommendations for 2nd round:* |

*Suggestion on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title**  | **Assigned Company,****WF or LS lead** |
| #1 |  |  |

### 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”* |

## 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 #6: TCs of Inter-frequency measurement requirement without MG (7.13.2.2.5)

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2014226 | Apple | Introduce RRM test case for inter-frequency measurement without gap: SA event triggered reporting tests for FR1 when DRX is used  |
| R4-2014365 | MediaTek inc. | Define test case for SA event triggered reporting tests for FR2 without gap when DRX is used |
| R4-2014645 | Qualcomm, Inc. | Observation 1: There are valid SSB configurations under 10MHz channel BW with 15kHz SCS, 40MHz channel BW with 30kHz SCS, and 100MHz channel BW with 120kHz SCS for inter-frequency without measurement gap scenarios.Proposal 1: Test coverage for inter-frequency measurement without MG is as listed in Table 2-1.

|  |  |  |
| --- | --- | --- |
| RAT\FR | FR1 | FR2 |
| EN-DC | No DRx, without SSB index reading | No DRx, without SSB index reading |
| NR-SA | DRx, without SSB index reading | DRx, without SSB index reading |

Proposal 2: Do not configure gap in inter-frequency measurement without MG tests. |
| R4-2014731 | CMCC | Proposal 1: It is proposed that RAN4 agreed on the following TC list for R16 inter-frequency measurement without MG.

|  |  |
| --- | --- |
| **TC** | Company |
| TC1: SA event triggered reporting tests for FR1 without gap when DRX is not used (A.6.6.2.X) | CMCC |
| TC2: SA event triggered reporting tests for FR1 when DRX is used (A.6.6.2.X) | Apple |
| TC3: SA event triggered reporting tests for FR2 without gap when DRX is not used (A.7.6.2.X) | Huawei |
| TC4: SA event triggered reporting tests for FR2 without gap when DRX is used (A.7.6.2.X) | Mediatek |
| Note: existing TCs only consider test cases without SSB time index detection |

Proposal 2: It is proposed that RAN4 further discuss whether to introduce test case with SSB time index detection. The proposed alternatives are:* Alt1: TC1 FDD is without SSB time index detection, TC2 FDD is with SSB time index detection
* Other alternatives are not precluded.
 |
| R4-2014732 | CMCC | Define test case for SA event triggered reporting tests for FR1 without gap when DRX is not used |
| R4-2015497 | Huawei, HiSilicon | Specifying the inter-frequency measurements SA event triggered reporting tests for FR2 without gap when DRX is not used. |

## 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 6-1 TC list for inter-frequency measurement requirement without MG

*Sub-topic description:*

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

**Issue 6-1: TC list for inter-frequency measurement requirement without MG**

* Proposal:
	+ Option 1 (Qualcomm):
		- Test coverage for inter-frequency measurement without MG is as listed in gollowing table.

|  |  |  |
| --- | --- | --- |
| RAT\FR | FR1 | FR2 |
| EN-DC | No DRx, without SSB index reading | No DRx, without SSB index reading |
| NR-SA | DRx, without SSB index reading | DRx, without SSB index reading |

* + Option 2 (CMCC):
		- It is proposed that RAN4 agreed on the following TC list for R16 inter-frequency measurement without MG.

|  |  |
| --- | --- |
| **TC** | Company |
| TC1: SA event triggered reporting tests for FR1 without gap when DRX is not used (A.6.6.2.X) | CMCC |
| TC2: SA event triggered reporting tests for FR1 when DRX is used (A.6.6.2.X) | Apple |
| TC3: SA event triggered reporting tests for FR2 without gap when DRX is not used (A.7.6.2.X) | Huawei |
| TC4: SA event triggered reporting tests for FR2 without gap when DRX is used (A.7.6.2.X) | Mediatek |
| Note: existing TCs only consider test cases without SSB time index detection |

* Recommended WF
	+ TBA

### Sub-topic 6-2 TC configurations for inter-frequency measurement without MG

*Sub-topic description:*

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

**Issue 6-2-1: MG configuration in TCs**

* Proposal (Qualcomm):
	+ Do not configure gap in inter-frequency measurement without MG tests.
* Recommended WF
	+ TBA

**Issue 6-2-2: SSB time index detection in TCs**

* Proposal (CMCC)
	+ It is proposed that RAN4 further discuss whether to introduce test case with SSB time index detection. The proposed alternatives are:
		- Alt1: TC1 FDD is without SSB time index detection, TC2 FDD is with SSB time index detection
		- Other alternatives are not precluded.
* Recommended WF
	+ TBA

## Companies views’ collection for 1st round

### Open issues

**Issue 6-1: TC list for inter-frequency measurement requirement without MG**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |
| YYY |  |

**Issue 6-2-1: MG configuration in TCs**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |
| YYY |  |

**Issue 6-2-2: SSB time index detection in TCs**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |
| YYY |  |

### 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** |
| R4-2014226 (Apple CR) | Company A |
| Company B |
|  |
| R4-2014365 (MTK CR) | Company A |
| Company B |
|  |
| R4-2014732 (CMCC CR) | Company A |
| Company B |
|  |
| R4-2015497(Huawei CR) | 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.*

|  |  |
| --- | --- |
|  | **Status summary**  |
| **Sub-topic#1** | *Tentative agreements:**Candidate options:**Recommendations for 2nd round:* |

*Suggestion on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title**  | **Assigned Company,****WF or LS lead** |
| #1 |  |  |

### 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”* |

## 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 #7: TCs of UE-specific CBW change (7.13.2.2.7)

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2014278 | Apple |

|  |  |
| --- | --- |
| **Test case list for UE specific CBW change** | **TC parameters** |
| TC1: UE specific CBW change on FR1 NR PSCell with non-DRX in synchronous EN- DC (A.4.5.x) | * *offsetToCarrier* is changed for TC of UE specific CBW change, while *carrierBandwidth* is unchanged in this TC (same as RF channel BW defined in each test)*.*
* Reuse the parameters as much as possible from TC of RRC based BWP switching except the BWP switching parameters.
 |
| TC2: UE specific CBW change on FR2 NR PSCell with non-DRX in synchronous EN- DC (A.5.5.x) |
| TC3: UE specific CBW change on FR1 NR PCell with non-DRX in NR SA (A.6.5.x) |
| TC4: UE specific CBW change on FR2 NR PCell with non-DRX in NR SA (A.7.5.x)                                |

Proposal: RAN4 agrees on the above TC list. |
| R4-2014279 | Apple | Add the test case of UE specific CBW change on FR1 NR PSCell with non-DRX in synchronous EN-DC into TS38.133. |
| R4-2015302 | NEC | Addition of TCs for UE specific CBW change on FR2 NR PCell in NR SA |
| R4-2015777 | Huawei, HiSilicon | Introduce TC for UE specific CBW change on FR2 NR PSCell in EN-DC. |
| R4-2016168 | Ericsson | In the test the UE-specific CBW change is realized by changing only the *offsetToCarrier* without changing *carrierBandwidth* or any other BW related parameter. This allows the reuse of most of the parameters in the current test case on RRC based active BWP switching in A.6.5.6.2.1. |
| R4-2016169 | Ericsson | Test case is defined to verify delay requirement on UE specific CBW change on FR1 NR PCell in NR SA scenario. |

## 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 7-1 TC list for UE-specific CBW change

*Sub-topic description:*

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

**Issue 7-1-1: TC list for UE-specific CBW change**

* Proposal (Apple):

|  |  |
| --- | --- |
| **Test case list for UE specific CBW change** | **TC parameters** |
| TC1: UE specific CBW change on FR1 NR PSCell with non-DRX in synchronous EN- DC (A.4.5.x) | * *offsetToCarrier* is changed for TC of UE specific CBW change, while *carrierBandwidth* is unchanged in this TC (same as RF channel BW defined in each test)*.*
* Reuse the parameters as much as possible from TC of RRC based BWP switching except the BWP switching parameters.
 |
| TC2: UE specific CBW change on FR2 NR PSCell with non-DRX in synchronous EN- DC (A.5.5.x) |
| TC3: UE specific CBW change on FR1 NR PCell with non-DRX in NR SA (A.6.5.x) |
| TC4: UE specific CBW change on FR2 NR PCell with non-DRX in NR SA (A.7.5.x)                                |

* Recommended WF
	+ TBA

**Issue 7-1-2: new section for CBW configuration**

* Proposal (NEC): add the following generic section into TS38.133

Table A.3.x.1-1: DL CBW patterns for UE specific CBW configuration

|  |  |  |
| --- | --- | --- |
| BWP Parameters | Unit | Values |
| Reference CBW |  | DLCBW.1.1 | DLCBW.1.2 |
| OffsetToCarrier | RB | 0 | RBx Note 1 |
| carrierBandwidth | RB | Same as RF channel defined in each test | Same as RF channel defined in each test |
| Note 1: RBx is offset in frequency domain between Point A (lowest subcarrier of common RB 0) and the lowest usable subcarrier on this carrier. Note that RBx has to be within the CBW of BS. |

* Recommended WF
	+ TBA

## Companies views’ collection for 1st round

### Open issues

**Issue 7-1-1: TC list for UE-specific CBW change**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |
| YYY |  |

**Issue 7-1-2: new section for CBW configuration**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |
| YYY |  |

### 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** |
| R4-2014279 (Apple CR) | Company A |
| Company B |
|  |
| R4-2015302 (NEC CR) | Company A |
| Company B |
|  |
| R4-2015777 (Huawei CR) | Company A |
| Company B |
|  |
| R4-2016169 (Ericsson CR) | 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.*

|  |  |
| --- | --- |
|  | **Status summary**  |
| **Sub-topic#1** | *Tentative agreements:**Candidate options:**Recommendations for 2nd round:* |

*Suggestion on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title**  | **Assigned Company,****WF or LS lead** |
| #1 |  |  |

### 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”* |

## 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 #8: TCs of Inter-band CA requirement for FR2 UE measurement capability of independent Rx beam (7.13.2.2.9)

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2015173 | Ericsson | Proposal 1 : Test case A.7.5.2.1 (Interruptions during measurements on deactivated NR SCC in FR2) may be directly applied for FR2+FR2 interband CA testingProposal 2 : Test case - Interruption duration if the PCell is not in the same band as the deactivated SCell and  SCell Activation and deactivation for FR1+FR2 inter-band with target SCell in FR2 may be reused for FR2 interband CA testingProposal 3 : Test case A.7.5.6.1.2 NR FR1- NR FR2 DL active BWP switch of PCell with non-DRX in SA FR2 may be reused for FR2 interband CA testingProposal 4 : The test case list for interband FR2+FR2 CA is

|  |  |
| --- | --- |
| Test 1 | SCell Activation and deactivation for FR2+FR2 inter-band |
| Test 2 | NR FR2- NR FR2 DL active BWP switch of PCell with non-DRX in SA |

 |
| R4-2015475 | Huawei, HiSilicon | Proposal 1: For SCell activation and deactivation delay requirements, it is suggested to introduce new test cases for FR2 inter-band CA scenario in Rel-16.Proposal 2: For SCell activation and deactivation delay test in FR2 inter-band CA, it is suggested that the test consists of three time period.* Before the test starts, the UE is connected to Cell 1 (PCell) on FR2 band 1.
* At the beginning of T1, the UE receives an RRC message to add Cell 2 as SCell on FR2 band 2. The time duration T1 is the preparation period for the test.
* At the beginning of T2, the UE receives a MAC message for SCell activation. During time duration T2, the SCell activation delay and interruptions to PCell need to be tested.
* At the beginning of T3, the UE receives a MAC message for SCell deactivation. During time duration T3, the SCell deactivation delay and interruptions to PCell need to be tested.
 |
| R4-2015476 | Huawei, HiSilicon | To introduce the SCell activation and deactication delay test for FR2 inter-band CA scenario |
| R4-2016577 | Qualcomm Incorporated | Proposal 1: RAN4 to introduce RRM test case(s) for IBM UEs supporting inter-band FR2 CA to verify if the UE meets RRM performance requirement(s) on both inter-bands when 2 AoAs are concurrently active from different angles, provided that* 2 AoAs are (pseudo) randomly selected and/or at least [X] degrees apart within a spherical coverage
	+ If any restriction is identified by RF session, it should be respected and possible test directions will be updated accordingly
* Both inter-band CCs transmit and configure reference signal(s) for independent beam management
* SSB on one band and CSI-RS and/or PDCCH/PDSCH on the other band can have different numerologies
* At least one RRM accuracy performance requirement should be met on both bands, and FFS on which RRM requirement
 |

## 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 8-1 TC list for inter-band CA requirement for FR2 UE measurement capability of independent Rx beam

*Sub-topic description:*

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

**Issue 8-1: TC list for inter-band CA requirement for FR2 UE measurement capability of independent Rx beam**

* Proposal:
	+ Option 1 (Ericsson): The test case list for interband FR2+FR2 CA is

|  |  |
| --- | --- |
| Test 1 | SCell Activation and deactivation for FR2+FR2 inter-band |
| Test 2 | NR FR2- NR FR2 DL active BWP switch of PCell with non-DRX in SA |

* + Option 2 (Huawei): For SCell activation and deactivation delay requirements, it is suggested to introduce new test cases for FR2 inter-band CA scenario in Rel-16.
* Recommended WF
	+ TBA

### Sub-topic 8-2 TC configurations for inter-band CA requirement for FR2 UE measurement capability of independent Rx beam

**Issue 8-2: TC configurations for inter-band CA requirement for FR2 UE measurement capability of independent Rx beam**

* Proposal 1(Huawei): For SCell activation and deactivation delay test in FR2 inter-band CA, it is suggested that the test consists of three time period.
	+ Before the test starts, the UE is connected to Cell 1 (PCell) on FR2 band 1.
	+ At the beginning of T1, the UE receives an RRC message to add Cell 2 as SCell on FR2 band 2. The time duration T1 is the preparation period for the test.
	+ At the beginning of T2, the UE receives a MAC message for SCell activation. During time duration T2, the SCell activation delay and interruptions to PCell need to be tested.
	+ At the beginning of T3, the UE receives a MAC message for SCell deactivation. During time duration T3, the SCell deactivation delay and interruptions to PCell need to be tested.
* Proposal 2(QC): RAN4 to introduce RRM test case(s) for IBM UEs supporting inter-band FR2 CA to verify if the UE meets RRM performance requirement(s) on both inter-bands when 2 AoAs are concurrently active from different angles, provided that
	+ 2 AoAs are (pseudo) randomly selected and/or at least [X] degrees apart within a spherical coverage
		- If any restriction is identified by RF session, it should be respected and possible test directions will be updated accordingly
	+ Both inter-band CCs transmit and configure reference signal(s) for independent beam management
	+ SSB on one band and CSI-RS and/or PDCCH/PDSCH on the other band can have different numerologies
	+ At least one RRM accuracy performance requirement should be met on both bands, and FFS on which RRM requirement.
* Recommended WF
	+ TBA

## Companies views’ collection for 1st round

### Open issues

**Issue 8-1: TC list for inter-band CA requirement for FR2 UE measurement capability of independent Rx beam**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |
| YYY |  |

**Issue 8-2: TC configurations for inter-band CA requirement for FR2 UE measurement capability of independent Rx beam**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |
| YYY |  |

### 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** |
| R4-2015476 (Huawei CR) | Company A |
| 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.*

|  |  |
| --- | --- |
|  | **Status summary**  |
| **Sub-topic#1** | *Tentative agreements:**Candidate options:**Recommendations for 2nd round:* |

*Suggestion on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title**  | **Assigned Company,****WF or LS lead** |
| #1 |  |  |

### 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”* |

## 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”* |