**3GPP TSG-RAN4 Meeting #102-e *R4-220xxxx***

**Electronic Meeting, 21 February – 3 March, 2022**

**Agenda item:** 4.1.6, 4.1.7

**Source:** Moderator (Huawei)

**Title:** Email discussion summary for [102-e][201] Maintenance\_R15\_NR\_RRM

**Document for:** Information

# Introduction

The scope of this email discussion includes the following agenda items:

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| 4.1.6 RRM core requirements (38.133/36.133) [NR\_newRAT-Core]  4.1.7 RRM performance requirements (38.133/36.133) [NR\_newRAT-Perf] |

In providing comments, companies are encouraged to:

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# Topic #1: Rel-15 NR RRM core requirements

## Companies’ contributions summary

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| **T-doc** | **Company** | **Proposals / Observations** |
| [**R4-2203593**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203593.zip) | ZTE Corporation | CR:  Specify that the cell phase sync requirements are measured at either antenna connectors or RIBs. |
| [**R4-2203799**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203799.zip) | Apple | CR (36133):  Correct the note 1 in tables of section 8.1.2.4.21.1.1 for correct reference to TS36.133 section 5: DRX status definition. |
| [**R4-2203837**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203837.zip) | Qualcomm Incorporated | CR:  Removed the description related to UE reporting CQI before completing SCell activation and reporting L1-RSRP before completing first L1-RSRP measurement. |
| [**R4-2204178**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204178.zip) | MediaTek inc. | Proposal 1: RAN4 to specify the applicable DRX cycle for the infer-frequency measurement requirement in NR-DC and NE-DC mode  Proposal 2: In NR-DC mode, the applicable DRX cycle for the infer-frequency measurement requirement follows the maximum of configured MCG DRX cycle and SCG DRX cycle  Proposal 3: In NE-DC mode, the applicable DRX cycle for the infer-frequency measurement requirement follows the maximum of configured MCG DRX cycle and SCG DRX cycle |
| [**R4-2204179**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204179.zip) | MediaTek inc. | CR:  Changes as proposed in R4-2204178 |
| [**R4-2204308**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204308.zip) | OPPO | CR:  Remove the cell-ranking criteria for inter-RAT measurements. |
| [**R4-2204544**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204544.zip) | Nokia, Nokia Shanghai Bell | Proposal 1: For the case where the MCG and the SCG configure an inter-frequency or an inter-RAT measurement on a common ssbFrequency, no clarifications are needed.  Proposal 2: For the case in which an inter-frequency or an inter-RAT measurement is configured on a serving carrier, no clarifications are needed. |
| [**R4-2204552**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204552.zip) | OPPO | CR (36133):  Remove the cell-ranking criteria for inter-RAT measurements subject to CCA. |
| [**R4-2204802**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204802.zip) | vivo | CR:  Add corresponding text for measurement accuracy for inter-RAT LTE cell identification requirements |
| [**R4-2204838**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204838.zip) | Huawei, Hisilicon | CR:  Interruption requirements for SCell addition/ activation are updated for the case when SMTC or SSB configuration is not provided for the SCell. |
| [**R4-2204841**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204841.zip) | Huawei, Hisilicon | CR (36133):  Interruption requirements for SCell addition/ activation are updated for the case when SMTC or SSB configuration is not provided for the SCell. |
| [**R4-2205341**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205341.zip) | Huawei, HiSilicon, Apple | CR:  Update SCell activation delay requirements  1. Remove [] around 2400ms  2. Add UE capability scellWithoutSSB to FR1 SSB-less requirements  3. Correct the description for FR1 unknown case |
| [**R4-2205342**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205342.zip) | Huawei, HiSilicon, Apple | CR for Rel-16 due to spec difference:  Update SCell activation delay requirements  1. Remove [] around 2400ms  2. Add UE capability scellWithoutSSB to FR1 SSB-less requirements |
| [**R4-2205344**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205344.zip) | Huawei, HiSilicon | CR:  1. Correct the clause number for the applicable requirements for inter-frequency RSTD measurement in EN-DC.  2. Remove [] in requirements for inter-frequency RSTD requirements for LTE SA. |
| [**R4-2205406**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205406.zip) | ZTE Corporation | CR:  Specify in general symbols and abbreviations that the measurement is done at either antenna connectors or RIBs. |
| [**R4-2205518**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205518.zip) | Ericsson | Proposal 1: RAN4 to introduce the max function for timer T = max(10s, [K1]\*N1\*M1\*DRX cycles), where N1 is defined in Table 4.2.2.2-1, and K1 is 16 if DRX cycle is 0.32s, 8 if DRX cycle is 0.64s, otherwise, K1 = 4.  Proposal 2: DRX cycle for NR-DC inter-frequency case shall follow the principles agreed for intra-frequency measurements.  Proposal 3: DRX cycle for NE-DC shall be follow the principles mentioned in below table.   |  |  |  | | --- | --- | --- | | **NE-DC** |  | **Applicable DRX** | | Measurement objects configured by MN | Inter-frequency NR | Follow MCG DRX configuration and state | | Inter-RAT LTE  (36.133 8.17.4) | Follow SCG DRX configuration and state | | Follow MCG DRX configuration and state | | Measurement objects configured by SN | Inter-frequency NR (38.133 9.3) | |
| [**R4-2205519**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205519.zip) | Ericsson | CR:  Changes as proposed in R4-2205518 |

## Open issues summary

Note: Only issues proposed in discussion papers are listed in this section. For other issues proposed via CR, comments can be provided in section 1.3.2 to the CRs directly. If some issues are found controversial based on 1st round discussion, new open issues can be added in the 2nd round if needed.

### Sub-topic 1-1: Measurement requirements

#### Issue 1-1-1: Applicable DRX cycle for measurmenet in NE-DC and NR-DC

* Proposals
  + Option 1 (MTK R4-2204178)
    - RAN4 to specify the applicable DRX cycle for the inter-frequency measurement requirement in NR-DC and NE-DC mode
    - In NR-DC mode, the applicable DRX cycle for the inter-frequency measurement requirement follows the maximum of configured MCG DRX cycle and SCG DRX cycle
    - In NE-DC mode, the applicable DRX cycle for the inter-frequency measurement requirement follows the maximum of configured MCG DRX cycle and SCG DRX cycle
  + Option 2 (Nokia R4-2204544)
    - For the case where the MCG and the SCG configure an inter-frequency or an inter-RAT measurement on a common ssbFrequency, no clarifications are needed.
    - For the case in which an inter-frequency or an inter-RAT measurement is configured on a serving carrier, no clarifications are needed.
    - *Moderator’s Note: proposals in Option 2 are based on the following observations.*
      * If the UE has received two independent measurement configurations containing measurement objects with different *ssbFrequency*, one for MCG and another for SCG, the UE applies the DRX cycle of the CG that is associated with the measurement.
      * When the UE receives two independent measurement configurations, one from MCG and one for the SCG, with measurement objects with the same *ssbFrequency*, the UE shall fulfil the requirements in both MCG and SCG. To fulfil the current minimum requirements, the UE must use the shortest DRX cycle of MCG and SCG, for the UE to ensure that the UE can fulfil the measurement requirements with a single physical measurement.
      * In order to fulfil current measurement requirements, if the UE has received two independent measurement configurations containing measurement objects with the same *ssbFrequency*, one for MCG and another for SCG, and the *ssbFrequency* is the same as a serving cell carrier, in either MCG or SCG, the UE applies the DRX cycle of the CG that contains this serving cell.
  + Option 3 (Ericsson R4-2205518)
    - DRX cycle for NR-DC inter-frequency case shall follow the principles agreed for intra-frequency measurements.
    - DRX cycle for NE-DC shall be follow the principles mentioned in below table.
    - *Moderator’s Note: the table is updated based on offline clarification with Ericsson.*

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| **NE-DC** |  | **Applicable DRX** |
| Measurement objects configured by MN | Inter-frequency NR | Follow MCG DRX configuration and state |
| Inter-RAT LTE  (36.133 8.17.4) | Follow SCG DRX configuration and state |

* Recommended WF
  + Further discuss the options

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| **Company** | **Comments** |
| MTK | Support Option 1.  Option 2 and Option 3 would have backward compatibility issues to the UEs on the market.  Besides, there would be some cases in Option 3 /2 are not covered, e.g.  · NR-DC (FR1-FR2) inter-RAT LTE  · NE-DC Inter-RAT UTRA/ GSM |
| Apple | Support option 1 which can make all the UE implementation meet the requirement if such clarification is added |
| Ericsson | Option 3. Not support option 1. |
| Qualcomm | Okay with Option 1 |
| Huawei | We support option 1 considering this is for Rel-15. We are open to consider option 2 and 3 for later releases. |
| Nokia | In our discussion paper (R4-2204544) we point out different scenarios of the measurement configuration, where the *ssbFrequency* of the measurement objects configured by MCG and SCG can be different, or the same.  In our view, it is clear from 38.331 that the UE follows the configuration of the CG that configured the measurement – this is also the principle agreed for intra-frequency measurements. Therefore, our proposal is that no clarification is needed in TS 38.133.  If the *ssbFrequency* to be measured configured by both MCG and SCG is the same, the UE shall fulfil the minimum requirements for both MCG and SCG. The minimum requirement follows the DRX configuration of the CG that configured the measurement, and the UE shall fulfill these minimum requirements. Hence, UE shall measure the Object according to CG requirements (and DRX).  As the UE is already required to fulfill the minimum requirements, there is no increase in the number of measurements to be performed, as the UE anyway only need to physically measure one and same measurement object. The UE will use the shortest DRX cycle (otherwise it cannot fulfill the minimum requirements). However, as this is already the spirit of the specification, we do not see any clarification is needed in the RAN4 specification.  The last case pointed out in our discussion paper is the case in which the *ssbFrequency* is the same, and it is the frequency of a serving cell in either MCG or SCG. In this case, the principle is already agreed: the UE follows the configuration of the CG that is “in use”. So no clarification is needed in TS 38.133. |

### Sub-topic 1-2: Idle mode mobility

#### Issue 1-2-1: FR2 cell reselection in Idle mode

* Proposals
  + Option 1 (Ericsson R4-2205518)
    - RAN4 to introduce the max function for timer T = max(10s, [K1]\*N1\*M1\*DRX cycles), where N1 is defined in Table 4.2.2.2-1, and K1 is 16 if DRX cycle is 0.32s, 8 if DRX cycle is 0.64s, otherwise, K1 = 4.

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| If the UE in RRC\_IDLE has not found any new suitable cell based on searches and measurements using the intra-frequency, inter-frequency and inter-RAT information indicated in the system information for 10 s, the UE shall initiate cell selection procedures for the selected PLMN as defined in TS 38.304 [1]. |

* Recommended WF
  + Further discuss is option 1 is agreeable

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| **Company** | **Comments** |
| MTK | We can support Option 1, because there is no backward capability issue observed. |
| Apple | Since R15 UE is on the market, we are wondering: if companies want to have this revision, could it be introduced in late release, e.g., R17. |
| vivo | We are ok with option 1. |
| Ericsson | In NR FR1, current 10s is fine since the evaluation time Nserv, Tevaluate are all less than 10s.  In NR FR2, considering Rx beam sweeping factor N1, the evaluation time Nserv, Tevaluate are much larger than 10s which implies the UE will initiate cell selection for the selected PLMN regardless of UE finishing once serving cell and neighbour cell evaluation in FR2.  We want to confirm the principle first, and we’re open to further consider update it in which release and consider the impact to the UE already in the market since it is very late in R15. |
| Intel | We are also afraid that the R15 field UE implementation is affected by NBC issue. Let’s check with companies on the issue and decide which release we should start with. We are OK to introduce the change in either R16 or R17. |
| Huawei | First we agree with Apple and Intel that making this change to Rel-15 (and Rel-16) is too late as it will impact UE implementation, and we suggest to consider it in Rel-17.  Technically, we do not see strong need to introduce this change. For example, if there is no suitable cell, with this change UE will have to stay in the old serving cell (which does not fulfil S criteria) for additional 30s which is quite long and may impact user experience significantly. We think 10s in current spec is a reasonable value. It is noted that even there are suitable cells on the carriers configured for measurement, initiating cell selection does not necessarily mean longer delay for UE to find a new suitable cell for camping. |
| Nokia | We have different understanding on the need for this clarification. Our understanding of the specification is the UE shall search for 10 second, if the UE has determined that the serving cell has not fulfilled the cell selection criteria for Nserv consecutive DRX cycles. The evaluation of the serving cell selection criteria is done according to the DRX cycles and table 4.2.2.2-1 (Nserv). However, the search following UE detecting that the cell selection criteria is no longer fulfilled is done for a period of 10 second and no more. How the UE actually implements this search is UE implementation specific. |

## Companies views’ collection for 1st round

### Open issues

### CRs/TPs comments collection

1. Cat-A draftCRs are not listed for comments.
2. R4-2204552 from OPPO is to be treated in email 203 and hence not listed.
3. R4-2119443 from Ericsson, Intel, Huawei, HiSilicon, Qualcomm is not listed, and it will be treated in email 233.

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| **CR/TP number** | **Comments collection** |
| R4-2203593 (ZTE) | Maintenance for cell phase synchronization accuracy |
| Ericsson: OK |
| Nokia: OK |
| R4-2203799 (Apple) | Draft CR on core part maintenance for TS36.133 R15 |
| MTK: OK. Follow serving cell RAT makes sense. |
| Ericsson: Agree the principle that the requirement should follow LTE DRX, but the reference section 5 is not the ‘DRX status definition’. Could you double check it? |
| Apple:  [Reply to Ericsson]: thanks for the question. In LTE spec, the DRX status definition in placed in the section 5 as below, so we think the requirement table in CR shall be referred to section 5. |
| Nokia: We think more discussion needed. We agree with Apple: The DRX configuration shall follow the configuration of the CG that configured the measurement, in this case, LTE. Therefore, it is ok to update the reference in the inter-RAT measurement for LTE SA UE.  However, the section states ‘Requirements in this clause shall apply for NR capable UE when not configured with EN-DC’ and hence, it is not fully clear exactly what we address with the change because we also have a Note 2 ‘In EN-DC operation, the parameters, timers and scheduling requests referred to in section 3.6.1 of TS 38.133 [50] are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group’  Hence, we should clarify the overall requirements before agreeing this CR. |
| R4-2203837 (QC) | draft Cat-F CR (R15) to SCell Activation Core |
| MTK: We observe there are many CRs addressing the same issues (including core and perf) have been submitted into many WIs. And we suggest to have Technical discussion in Rel-15. Other WIs just follow the conclusion, in order to have a consistent solution.  We disagree with this CR to remove the UE behavior related to "out of range".  We see no contradiction between RAN1 and RAN4 spec. RAN4 spec can be modified to capture RAN1 behavior.  Even with RAN1 spec, we do not need to delete the paragraph entirely. With this sentence removed, it seems like UE has to report accurate CQI values as long as the CSI-RS is received by UE. This sounds risky. It is still possible that UE receives the CSI-RS but UE has not completed the SCell activation. |
| Apple: We think the revision is not necessary, because this issue has been discussed in RAN1 (the email discussion summary in RAN1 is R1-2112685) and no any spec change is concluded. The common understanding is RAN1 would follow RAN4 and no change is needed, but some companies didn’t think it’s necessary to capture any conclusion without spec change, as duplicated below,  All companies agree with the following UE behavior,  In terms of UE CSI report during SCell activation, from the slot specified in clause 4.3 of TS 38.213 to the time when UE completes the SCell activation (i.e., reports a valid CQI), UE shall report Out of Range (OOR) for CQI and lowest valid SS-RSRP range for L1-RSRP, as specified in 38.133  However, there are companies objecting to capture any conclusion without specification change.  From Chair, “Since there is no conclusion or specification change from this email thread (and I expect no further discussions in future meetings), we close this email thread and reject R1-2111846”. |
| Ericsson: It seems the correction isn’t needed based on the explanation in the CR.  In my understanding, TS38.214 specifies the UE behavior in the period between CSI reporting (re)configuration to the first CSI measurement resources -> UE drop the reporting  On the other hand, TS38.133 specifies the UE behavior in the period between UE receive the SCell activation/deactivation MAC CE command to UE complete the SCell activation/deactivation -> UE reports the out-of-range (CQI 0). |
| Qualcomm:  Thank Apple for sharing the background around this controversial issue. That is exactly our point of removing the condition of OOR CQI report from the criteria of pass vs fail.  After the lengthy RAN1 discussion on this matter, no conclusion was reached in terms of whether and what to change, rather it was decided to leave the ambiguity without further clarification in any spec. Therefore, no report OOR during SCell activation shall not be a criterion that determines UE requirement pass vs. fail. |
| Huawei:  We do not think the changes are needed.  We do not see conflict between requirements in 38133 and the excerpt from 38214. Finally, the two sentences have been there since Rel-15, and we have not seen any confusion in implementation.  In fact, we have similar view as MTK that removing the two sentences may cause confusion. Also, since RAN1 has discussed this issue based on current RAN4 requirements, removing the two sentences may require further RAN1 discussion which is undesirable. |
| Nokia: This CR needs more discussion. We do not necessarily agree that it is necessary to remove the text as UE is assumed reporting OoR. This can be argued as not being reporting |
| R4-2204179 (MTK) | CR on TS38.133 for applicable DRX cycle in NR-DC and NE-DC inter-frequency measurement  Moderator: related to 1-1-1 |
| Ericsson: Not support the CR. Please check the issue 1-1-1. |
| Nokia: We do not agree with this CR. If the UE follows the longest DRX cycle, it will not be following the DRX cycle configured by the network in one of the measurements (either configured by MCG or SCG). We think that RAN2 specification is clear: the UE shall follow the configuration of the CG that configured the measurement. So no clarification is needed in this case. |
| R4-2204308 (OPPO) | Draft CR to maintain inter-RAT measurements in TS 36.133 |
| MTK: OK. |
| Ericsson: OK |
| Huawei: we do not support the change in this CR.  We agree that the R criterion based reselection is not applicable for inter-RAT, but according to 36304 (as copied below) the cell ranking can be also used when more than one inter-RAT cell meets the absolute criterion, and we think the current margin values are still applicable.  *If more than one cell meets the above criteria, the UE shall reselect a cell as follows:*  *- If the highest-priority frequency is an E-UTRAN frequency, a cell ranked as the best cell among the cells on the highest priority frequency(ies) meeting the criteria according to clause 5.2.4.6;*  *- If the highest-priority frequency is from another RAT, a cell ranked as the best cell among the cells on the highest priority frequency(ies) meeting the criteria of that RAT.* |
| Nokia: We do not agree with this CR, it needs more discussion as it is not clear. 36.304 states: 5.2.4.5 NR Inter-frequency and inter-RAT Cell Reselection criteria If *threshServingLowQ* is broadcast in system information and more than 1 second has elapsed since the UE camped on the current serving cell, cell reselection to a cell on a higher priority NR frequency or inter-RAT frequency than the serving frequency shall be performed if:  - A cell of a higher priority NR or EUTRAN RAT/frequency fulfils Squal > ThreshX, HighQ during a time interval TreselectionRAT  Otherwise, cell reselection to a cell on a higher priority NR frequency or inter-RAT frequency than the serving frequency shall be performed if:  - A cell of a higher priority RAT/ frequency fulfils Srxlev > ThreshX, HighP during a time interval TreselectionRAT; and  - More than 1 second has elapsed since the UE camped on the current serving cell.  Cell reselection to a cell on an equal priority NR frequency shall be based on ranking for intra-frequency cell reselection as defined in clause 5.2.4.6. |
| R4-2204802 (vivo, Ericsson) | Draft CR on R15 inter-RAT LTE measurement |
| MTK: OK. |
| Nokia: We do not agree with this CR. It is not clear why this CR is needed. Section 9.4.2.2 already states:  The NR – E-UTRAN FDD RSRP measurement accuracy for all measured cells shall be as specified in clause 10.2.2. The NR – E-UTRAN FDD RSRQ measurement accuracy for all measured cells shall be as specified in clause 10.2.3. The NR – E-UTRAN FDD RS-SINR measurement accuracy for all measured cells shall be as specified in clause 10.2.5.  Same for the change to 9.4.3.2 |
| R4-2204838 (HW) | Correction to SCell Interruptions requirements\_EUTRA\_R15 |
| MTK: OK. But would be a typo in the cover page, the following reason should be for case a – SSB-less, isn’t it? “*For case b), assume SMTC duration is 0ms since UE doesn't need to perform AGC on SCell being added in this case*.” |
| Ericsson: Agree with the principle, but the interruption length needs to be updated:  if the UE supporting *scellWithoutSSB*, interruption =0ms other than TSMTC\_duration  Furthermore, the scenarios and the updates seem mismatch in ‘Reason for change’ |
| Qualcomm: Same comment as MTK.  In 'Reason for change', "For case a), assume SMTC duration for SCell being added/activated is 5ms since UE has to search SSB in the entire SSB-burst half frame, For case b), assume SMTC duration is 0ms since UE doesn't need to perform AGC on SCell being added in this case." should be the other way around. |
| Huawei: thanks for the comments.  To MTK/Ericsson/QC: we will fix the error in the cover sheet in the revision.  To Ericsson: we agree that UE does not need to do AGC but UE still needs to do RF re-tuning for the SCell activation, so we cannot define interruption length as zero (the interruption for AGC is zero as in the current CR). Hope this clarifies our understanding. |
| Nokia: More discussion is needed. The addition in the CR states:  ‘When no SMTC configuration is provided for the SCell being activated, SMTC duration for the SCell being activated is assumed to be 5ms if the UE is provided with SSB configuration (*absoluteFrequencySSB*), otherwise SMTC duration for the SCell being activated is assumed to be 0ms’  But if an SCell is added we assume the interruption X1 is a one-time interrupt when SCell is added. It is not clear how the added txt will impact.  Similar for activation. |
| R4-2204841 (HW) | Correction to SCell Interruptions requirements\_NR\_R15 |
| Ericsson: Agree with the principle, but the interruption length needs to be updated:  if the UE supporting *scellWithoutSSB*, interruption =0ms other than TSMTC\_duration  Furthermore, the scenarios and the updates seem mismatch in ‘Reason for change’ |
| Huawei: thanks for the comments.  To Ericsson: please kindly refer to our reply for R4-2204838 above. |
| Nokia: Same comment as for R4-2204838 |
| R4-2205341 (HW, Apple) | CR on SCell activation delay requirements 38133 R15 |
| MTK: One clarification on this change:  1.  If the is known and belongs to FR1, provided that the side condition Ês/Iot ≥ -2dB is fulfilled, then Tactivation\_time is:  - TFirstSSB\_MAX + TSMTC\_MAX + 2\*Trs + 5ms  Should it be known or unknown?  2.  And should is requirement to be aligned with R16’s version as the following?  *If the SCell is unknown and belongs to FR1, and if one of the following conditions is met*  *- ‘ssb-PositionInBurst’ indicates only one SSB is being actually transmitted, or*  *- ‘ssb-PositionInBurst’ indicates multiple SSBs and TCI indication is provided in same MAC PDU with SCell activation,*  *provided that the side condition Ês/Iot ≥ -2dB is fulfilled, Tactivation\_time is:*  *- TFirstSSB\_MAX + TSMTC\_MAX + Trs + 5ms, if the following conditions are met,*  *- the SCell is contiguous to an active serving cell in the same band, and*  *- its ssb-PositionInBurst is same as the one of contiguous FR1 active serving cell, and*  *- its SMTC offset is same as the one of contiguous FR1 active serving cell, and*  *- its RTD with contiguous FR1 active serving cell is smaller than or equal to 260ns with respect to the to-be-activated SCell’s SSB numerology, and its reception power difference with contiguous FR1 active serving cell is smaller than or equal to 6dB;*  *- TFirstSSB\_MAX + TSMTC\_MAX + 2\*Trs + 5ms, otherwise.*  MTK2 (further comment in 1st round): regarding our previous 2nd comment, we realized the above enhancement was introduced since R16 but not R15, thus no alignment is needed. Sorry for confusion. |
| Ericsson: OK |
| Huawei: thanks for the comments.  To MTK, the highlighted part should be “unknown”, and we can correct this typo in the revision.  On the alignment with Rel-16, we also understand that the quoted requirements are applicable for Rel-16 but not Rel-15, so no alignment is needed. Thanks for the clarification! |
| Nokia: In general, the CR is agreeable. Only one comment:  1) ‘supporting *scellWithoutSSB*’ should be moved |
| R4-2205342 (HW, Apple) | CR on SCell activation delay requirements 38133 R16 |
| MTK: OK. |
| Ericsson: OK |
| Nokia: In general, the CR is agreeable. Only one comment:  1) ‘supporting *scellWithoutSSB*’ should be moved |
| R4-2205344 (HW) | CR on RSTD measurement requirements 36133 R15 |
| MTK: OK. |
| Ericsson: OK |
| Qualcomm:  In section 3.6.2, delete this statement: "E-UTRAN OTDOA inter-frequency RSTD measurements requirements defined in section 8.1.2.6 except those for UE category 1bis,"  The rest looks OK. |
| Huawei: thanks for the comments.  To QC, we will remove the statement in the revision. |
| Nokia: OK |
| R4-2205406 (ZTE) | [draft CR] R15 Maintenance for 38133 |
| Ericsson: OK |
| Nokia: OK |
| R4-2205519 (Ericsson) | draftCR on RRM remaining issues - r15  Moderator: change #1 related to 1-2-1, change #2 and #3 are for other issues. |
| MTK: OK with change #1, #2 and #3. |
| Apple:  Change 2: the revision of “up to 1 UL SCell in each CG” is also confusing. Based on the 38.101-3, could it only focus on PCell UL and PSCell UL and no other UL on SCell?  Change 3: for the carrier number capability, we would like to check with other companies if RRM capability should be same as RF capability? If the answer is Yes, then not only the UL carrier number but also the DL carrier number shall be updated based on TS38.101.  For instance, in R15 TS38.133, DL NR carrier number of EN-DC is defined as:  - up to 7 NR DL CCs in total, with 1 UL (or 2 UL if SUL is configured) in PSCell and up to 1 UL (or 2 UL if SUL is configured) in SCell in different FR with PSCell.  However, in TS38.101-3, the DL NR carrier number for EN-DC BC of “DC\_2A\_n260M” is 8. |
| Huawei:  Change 1: we do not support the change in its current form and in Rel-15. Please kindly refer to our comments for issue 1-2-1.  Change 2: ok.  Change 3: the change is implying there can be only one SCell configured with SUL but there is no such limitation, so we suggest the following updated wording:  *up to 8 NR DL CCs in total, with 1 UL (or 2 UL if SUL is configured) in PCell and up to 7 UL in SCells (or additional 1 UL for each SCell if SUL is configured).* |
| Nokia:  Change#1: we have concern on the change. we can comeback after we have conclusion on the issue 1-2-1.  Change #2: We agree with the update.  Change#3: We agree with the update in general, but some clarification is needed.  Does this only apply for intra-band CA? |

## 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 #1: Rel-15 NR RRM performance requirements

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc** | **Company** | **Proposals / Observations** |
|  |  |  |
|  |  |  |
| [**R4-2203563**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203563.zip) | Anritsu Corporation | CR:  a) Defined new BWP configurations DLBWP.1.4 and ULBWP.1.4 to confine the allocated resource blocks to 24 RBs in general test parameter. Then changed associated parameters in the test parameter tables.  b) Added test parameter “BWchannel” and “Data RBs allocated” in general test parameter tables. |
| [**R4-2203564**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203564.zip) | Anritsu Corporation | CR for Rel-16 due to spec difference:  a) Defined new BWP configurations DLBWP.1.4 and ULBWP.1.4 to confine the allocated resource blocks to 24 RBs in general test parameter. Then changed associated parameters in the test parameter tables.  b) Added test parameter “BWchannel” and “Data RBs allocated” in general test parameter tables.  c) Corrected parameter names in Table A.5.5.1.6.1-3. |
| [**R4-2203565**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203565.zip) | Anritsu Corporation | CR for Rel-17 due to spec difference:  a) Defined new BWP configurations DLBWP.1.4 and ULBWP.1.4 to confine the allocated resource blocks to 24 RBs in general test parameter. Then changed associated parameters in the test parameter tables.  b) Added test parameter “BWchannel” and “Data RBs allocated” in general test parameter tables.  c) Corrected parameter names in cell specific test parameter tables. |
| [**R4-2203566**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203566.zip) | Anritsu Corporation | Proposal 1: Ginter is defined in the TS 38.133 independently from other relaxation factors.  Proposal 2: Ginter is applied to both the lower bound and upper bound of the test requirement for the relative SS-RSRP accuracy test.  Proposal 3: Gain reduction (D) is applied to the lower bound of the test requirement for the relative SS-RSRP accuracy test.  Observation 1: The idea to add the full volume of Y (i.e. 7 dB for PC3 UE) to the upper bound is not aligned with the current UE design which has fine beam and rough beam.  Observation 2: Actual gain differences between fine beam and rough beam for both beam peak direction (Y’) and spherical coverage direction (Z’) should be similar.  Observation 3: It is questionable that the new relaxation Y should be added to the upper bound of the test requirement.  Observation 4: Since the relaxation factor (1) and (2) has no correlation, it is natural that we define them independently and apply to the test requirement. |
| [**R4-2203567**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203567.zip) | Anritsu Corporation, MediaTek Inc. | CR:  • For the FR2 SS-RSRP Inter frequency relative accuracy in Table 10.1.5.1.2-1, refer to accuracy relaxation Ginter when the pair of cells are in different operating bands.  • For the FR2 SS-RSRP relative accuracy test requirement in Tables A.5.7.1.2.3-2 and A.7.7.1.2.3-2, add new parameters Ginter and D.  • Specify parameter Ginter in new clause B.2.1.5.2  • Specify parameter D in new clause B.2.1.5.3 |
| [**R4-2203570**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203570.zip) | Anritsu Corporation | CR:  (1) Test specification clean up :  - Removed erroneous clause concerning PSCell (Cell 2) transmission/ reception gap during Scell (Cell 3) BWP switching.  - Added UL BWP Configurations.  - Other editorial corrections.  (2) Change the name in Table A.4.7.5.1.2-3 and Table A.8.5.1.1.2-4 from “Configuration” to “Condition”.  (3) Added TRS configuration in Table A.6.3.2.1.3.1-3.  (4) Update cl. A.6.3.2.3.1.2 Test Parameters to include description that Cell 1 and Cell 2 belong to different tracking areas.  (5) Added specific THARQ settings in the general test parameters in Table A.6.5.3.1.1-2, and modified the comment column.  (6) Added separate CSI Report offset settings for the CSI reports for the PCell and SCell in Table A.6.5.3.1.1-3.  (7) Added a note updating the CSI-RS offset settings cell-specific test parameters table in Table A.6.5.3.1.1-3.  (8) Updated Active BWP ID in Table A.6.5.6.1.1.1-3:  ・Cell 1: 1, 2 🡪 0  ・Cell 2: 3 🡪 1, 2  Added missing TRS config |
| [**R4-2203596**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203596.zip) | Rohde & Schwarz | CR:  In TCs A.5.5.8.1, A.5.5.8.2, A.7.5.8.1, A.7.5.8.2 time multiplexing figures added for T1 and T2. The format followed in the one from RLM 2AoA TCs, with the difference, that OCNG is also switched from AoA1 to AoA2, since OP5 pattern assumes OCNG only in serving beam, which is in fact switched. |
| [**R4-2203599**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203599.zip) | Rohde & Schwarz | CR:  Dedicated CORSET reference channels CCR.1.1 FDD, CCR.1.1 TDD, CCR.2.1 TDD added, according to the similar non-inter-RAT TCs A.6.7.1.1, A.6.7.2.1, A.6.7.3.1. |
| [**R4-2203602**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203602.zip) | Rohde & Schwarz | CR:  In all intra-frequency event triggered measurement test cases, set the connection-related transmission parameters (RMC, TRS etc) for the neighbour cell to N/A. |
| [**R4-2203802**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203802.zip) | Apple | CR:  Add Es level to Table A.5.7.1.1.2-3: SS-RSRP Intra frequency OTA related test parameters |
| [**R4-2203831**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203831.zip) | Qualcomm Incorporated | CR:  Add note “When DRX is configured, PDSCH is scheduled only while drx-onDurationTimer is running, unless otherwise specified in the test case” to PDSCH RMCs |
| [**R4-2203834**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203834.zip) | Qualcomm Incorporated | CR:  For TC on E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in synchronous EN-DC  - Updated T1 value to 6.25 seconds.  - Removed the rate of correct events from test requirements. |
| [**R4-2203840**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203840.zip) | Qualcomm Incorporated | CR:  Remove the description related to UE reporting CQI before completing SCell activation and reporting L1-RSRP before completing first L1-RSRP measurement. |
| [**R4-2203892**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203892.zip) | CATT | CR:  Correct D1 and T2/T3 in TC for Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with CSI-RS-based RLM in non-DRX mode |
| [**R4-2204371**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204371.zip) | MediaTek Inc. | CR:  For TCs on RRC-based Active BWP Switch, clarify the start of T1 by separating the original wording into two cases:   * NR RRC message RRCReconfiguration is embedded in E-UTRA RRC message * NR RRC message RRCReconfiguration is not embedded in E-UTRA RRC message. |
| [**R4-2204374**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204374.zip) | MediaTek Inc. | Proposal 1: For the relative inter-frequency accuracy requirement, the following two additional margins should be considered:  (1) Mis-alignment between fine beam and rough beam  (2) Different antenna gain on different bands  Proposal 2: For the test case of FR2 inter-frequency relative RSRP accuracy, to add 5.5 (D) dB and 8.5 (D+ Ginter) dB margin in the lower bound for intra-band and inter-band, respectively, where  (1) D (Mis-alignment between fine beam and rough beam) = 5.5  (2) Ginter (Different antenna gain on different bands) = 3  Proposal 3: For the test case of FR2 inter-frequency relative RSRP accuracy, to add 3 (Ginter) dB margin in the upper bound for inter-band, where  (1) Different antenna gain on different bands (Ginter) = 3 dB |
| [**R4-2204844**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204844.zip) | Huawei, Hisilicon | CR:  measCycleSCell in TC A.4.5.3.2 and 6.5.3.2 (SCell activation TCs) are changed to 640ms. |
| [**R4-2204847**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204847.zip) | Huawei, Hisilicon | CR:  1. OffsetMO is changed to cellIndividualOffset in FR2 intra-frequency measurement without DRX TCs.  2. Io in FR2 intra-frequency measurement without DRX TCs are updated.  3. Value of rsrp-ThresholdSSB in FR2 BFD TCs are corrected.  4. Unit for Noc in CSI-RS based BFD TCs are corrected.  5. reportQuantity in FR2 TCs involving CSI reporting is changed to "cri-RI-PMI-CQI".  6. CSI reporting configuration is added in several FR2 TCs.  7. Antenna configuration 2X2 is added in FR2 RLM/BFD TCs.  8. Typos are corrected. |
| [**R4-2204856**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204856.zip) | Huawei, Hisilicon | Proposal 1:  Define additional margin in lower bound in FR2 inter-frequency relative RSRP accuracy TC:  • Margin due to misalignment between fine beam and rough beam (D), and  • Margin due to different antenna gain on different bands (Ginter)  Define additional margin in upper bound in FR2 inter-frequency relative RSRP accuracy TC:  • Y defined for each UE power class in Table B.2.1.3.1-1, TS 38.133 |
| [**R4-2205073**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205073.zip) | Ericsson | CR:  - A.7.3.2.1.1: Add parameters ‘BWchannel’ and ‘Data RBs allocated’ to align with A.7.3.2.1.2.  - A.7.3.2.1.2: Set Io value of T2/T3 in Cell 1 and T1/T2 in Cell 2 to align with A.7.3.2.1.1.  - \* Io = -83.1 + 10log10(24\*12) = -58.506. |
| [**R4-2205074**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205074.zip) | Ericsson | CR for Rel-16 due to spec difference:  - 6.2.1: It refers the wrong sub clauses B.2.x and they are not aligned with TS38.133 V15.16.0.  - A.7.3.2.1.1: Add parameters ‘BWchannel’ and ‘Data RBs allocated’ to align with A.7.3.2.1.2.  - A.7.3.2.1.2: Set Io value of T2/T3 in Cell 1 and T1/T2 in Cell 2 to align with A.7.3.2.1.1.  - \* Io = -83.1 + 10log10(24\*12) = -58.506. |

## Open issues summary

Note: Only issues proposed in discussion papers are listed in this section. For other issues proposed via CR, comments can be provided in section 1.3.2 to the CRs directly. If some issues are found controversial based on 1st round discussion, new open issues can be added in the 2nd round if needed.

### Sub-topic 2-1: FR2 inter-frequency relative RSRP accuracy

Moderator’s Note: the following table shows the AoA setup in FR2 inter-frequency relative RSRP accuracy TCs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Config** | **Unit** | **Test 1** | | **Test 2** | |
|  |  |  | **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** |
| Angle of arrival configuration | 1~2 |  | Setup 4b according to clause A.3.15.4.2 | | Setup 4b according to clause A.3.15.4.2 | |
|  |  |  | AoA1  Spherical coverage | AoA2  Rx Beam Peak | AoA1  Spherical coverage | AoA2  Rx Beam Peak |
| Assumption for UE beamsNote 7 | 1~2 |  | Rough | | Rough | |

Moderator’s Note: the following table shows the current test requirements in FR2 inter-frequency relative RSRP accuracy TCs

|  |  |
| --- | --- |
|  | **Test requirement Notes1,2,3,4** |
| Cell 2 – Cell 1 | SSB\_RP2 - SSB\_RP1 -δ ≤ Reported RSRP(dB) ≤ SSB\_RP2 - SSB\_RP1 +δ–(X) |
| Note 1: SSB\_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the cell n under consideration  Note 2: δ is the RSRP relative accuracy requirement from Table 10.1.5.1.2-1  Note 3: Void  Note 4: X is the Spherical coverage gain difference in dB, derived as (UE Refsens - UE Spherical coverage) from TS 38.101-2 [19] clauses 7.3.2 and 7.3.4, selected according to the UE power class and operating band. X is always a negative value. | |

Moderator’s Note: the following additional margins have been discussed in companies’ contributions

* D: margin due to mis-alignment between fine beam and rough beam
* Ginter: margin due to different antenna gain on different bands
* E: margin due to difference between Y’ and Z’
  + Y’: actual gain difference between fine and rough beam at peak direction
  + Z’: actual gain difference between fine and rough beam at spherical coverage direction

#### Issue 2-1-1: additional margins to the lower bound

* Proposals
  + Option 1 (Anritsu, MTK, HW)
    - Add the following margin to the lower bound when two cells are in different bands
      * D + Ginter
    - Add the following margin to the lower bound when two cells are in same band
      * D
* Recommended WF
  + Further discuss if option 1 is agreeable

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Apple | In general, analysis from companies on D and Ginter makes sense to us. One comment on Ginter: since this comes from RF transceiver gain difference, separation in frequency between two carriers plays a role here. Note that it doesn’t mean Ginter needs to be considered only for inter-band case. Frequency separation between the two carriers can be small between two band, e.g. between two low bands or two high bands. Furthermore, frequency separation could also be quite large for two carriers within the same band, e.g. up to 4GHz according to table 5.2-1 in TS38.101:   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | Operating Band | Uplink (UL) operating band BS receive UE transmit | | | Downlink (DL) operating band BS transmit  UE receive | | | Duplex Mode | |  | FUL\_low – FUL\_high | | | FDL\_low – FDL\_high | | |  | | n257 | 26500 MHz | – | 29500 MHz | 26500 MHz | – | 29500 MHz | TDD | | n258 | 24250 MHz | – | 27500 MHz | 24250 MHz | – | 27500 MHz | TDD | | n259 | 39500 MHz | – | 43500 MHz | 39500 MHz | – | 43500 MHz | TDD | | n260 | 37000 MHz | – | 40000 MHz | 37000 MHz | – | 40000 MHz | TDD | | n261 | 27500 MHz | – | 28350 MHz | 27500 MHz | – | 28350 MHz | TDD |   We were wondering if Ginter shall also be considered even for intra-band inter-frequency case.  On the other hand, considering forward compatibility, in higher frequency bands such FR2-2 the frequency separation between two carriers in the same band could be even much larger than existing FR2-1, this issue would become non-negligible. |
| MediaTek | Prefer option 1.  Regarding the question from Apple, it has been discussed in RAN4 #100-e. According to the discussion as below, we believe the majority view is to separate the case into intra-band and inter-band cases.  The discussion for intra-band and inter-band inRAN4 #100e is provided as following for reference.   |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **Sub-topic 1-2: FR2 inter-frequency relative RSRP accuracy**  ***Candidate options for 2nd round discussion****:*   * Option 1: MediaTek   + In all FR2 inter-frequency relative RSRP accuracy tests add 9 dB margin in the lower bound. * Option 2: QC   + The margin in the FR2 inter-frequency relative RSRP accuracy tests depend on how close the inter-frequency carriers are in frequency domain e.g. whether the carriers are in the same band or not.  |  |  | | --- | --- | | **Company** | **Comments** | | Ericsson | We support option 2. | | MediaTek | Support option 1. | | MediaTek2 | Originally, we refer to make the R15 requirement simple. But we can compromise to option 2 if some companies prefer to separate the requirement for inter-band and intra-band. | | Qualcomm2 | Thanks to MTK for considering a compromise. Should we keep the exact values FFS for now and return to this in the next meeting? | |  |  | | |
| Ericsson | Agree with option 1. |
| Apple | Thanks MTK for clarification. However, at least in our view discussion in RAN4#100e doesn’t preclude additional margin for intra-band inter-frequency, as can be seen in the agreement there is an FFS on margins for both cases:  Graphical user interface, text  Description automatically generated  On the other hand, we believe our proposal also aligns with option 2 in RAN4#100e: The margin in the FR2 inter-frequency relative RSRP accuracy tests depend on how close the inter-frequency carriers are in frequency domain. Difference between Intra-band and inter-band is just an example as also mentioned in option 2.  Additionally, companies made decision between option 2 and option 1. Note that option 1 proposed 9dB margin, which is larger than Ginter (most likely 3dB). If 3dB had been put on the table, it might be more acceptable.  With above justification, could we consider Ginter for intra-band inter-frequency as well? |
| Huawei | We are fine to add this margin on the lower bound. But we also agree with Apple’s comments the gain difference for intra-band inter-frequency is also significant in some cases. And we also suggest that the margin in both side should be well considered, otherwise, the test cases still cannot be implemented correctly if only part of the issue is fixed. |
| Qualcomm | As we have expressed before, we are concerned about adding too much margin to the requirements because it will take away from the usefulness of the test. Of course, uncertainty needs to be accounted for but we could also try to eliminate sources of uncertainty by modifying the test case. See our comments under issue 2-1-3.  Regarding option 1, we could support adding Ginter, assuming the value of Ginter is reasonable (e.g. 3 dB). Regarding the margin D, it could be avoided by modifying the test procedure. If no modification of the test case is agreeable, then we may compromise. |
| MediaTek | Response to Apple:  Thanks for the comment. To us, the margin for intra-band and inter-band are separated issue. We prefer to solve it case by case. Because it has been discussed for almost year. Maybe we can agree inter-band inter-frequency case first and to further discuss whether the margin for intra-band inter-frequency should have the same margin as inter-band inter-frequency.  Response to Qualcomm:  Thanks for the comment, please find our comment in Issue 2-1-3 |

#### Issue 2-1-2: additional margins to the upper bound

* Proposals
  + Option 1 (Anritsu, MTK)
    - Add the following margin to the upper bound when two cells are in different bands
      * Ginter
    - No margin is added to the lower bound when two cells are in same band
  + Option 2 (HW)
    - Add the following margin to the upper bound when two cells are in different bands
      * Ginter + E
    - Add the following margin to the lower bound when two cells are in same band
      * E
* Recommended WF
  + Further discuss the options

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Anritsu | On the margin E for option 2. It is appreciated if proponent provides a little more detail with regards to the mechanism on how the antenna gain of rough beam can be increased close to the one for fine beam at the beam peak direction, while a gain deference between the fine and rough beam at spherical coverage direction still exists. Does it mean a number of activated antenna elements differ between the peak direction and spherical coverage direction?  It is also appreciated if other chip vendors and UE vendors can confirm whether that kind of UE behavior can be observed.  For reference, I'd like to excerpt corresponding texts from R4-2204856.  “For instance, if the gain at AoA1 rough beam coverage is exact Z dB (defined in Table B.2.1.3.1-1) lower than AoA1 fine beam coverage, and the gain at AoA2 rough beam peak is close to the gain of fine beam peak. Then the actual difference could be larger than –X.” |
| Apple | Similar comment on Ginter as 2-1-1. Regarding E, we support to consider this on top of Ginter. Analysis from [R4-2204856](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204856.zip) makes sense to us. -X may not represent the actual maximum gain difference, especially for UE which has better performance than the minimum requirement of reference sensitivity. |
| MediaTek | We are fine to support option 2 even though we do not see the needs based on our measurement result. |
| Ericsson | We support option 1. |
| Huawei | Additional margin Y (or Z which may be more appropriate to be used) is considering the worst case theoretically. At least, it is unreasonable to assume the gain difference between fine and rough in peak direction Y’ (Y’<Y) and the gain difference between fine and rough in spherical coverage direction Z’(Z’<Z) are always same. As commented by Apple, there may be additional error caused by –X. Thus, we propose to introduce Y or Z additional margin in upper bound. We are also open to hear more views on the different values. |
| Qualcomm | We could consider supporting option 1 as a compromise, assuming the value of Ginter is reasonable (e.g. 3 dB). But we would not support adding even more margins on top of if. Again, if we keep adding margins to the test requirement then the usefulness of the test is diminished. |
| MediaTek | Response to Qualcomm:  Thanks for the comment, please find our comment in Issue 2-1-3 |

#### Issue 2-1-3: exact values for different margins

* Proposals for D
  + Option 1 (Anritsu, MTK)
    - 5.5dB
* Proposals for Ginter
  + Option 1 (Anritsu, MTK)
    - 3dB
* Proposals for E
  + Option 1 (HW)
    - Same value as Y

Table B.2.1.3.1-1: Gain difference Y between fine and rough beams, Rx beam peak direction

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Value “Y” in dB, for each UE power class | | | | |
| 1 | 2 | 3 | 4 | 5 |
| FFS | 9.0 | 7.0 | FFS | FFS |

* Recommended WF
  + Further discuss the options for each possible margin D, Ginter and E.

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Anritsu | We assume adding whole volume of Y is not aligned with the assumption that a UE equips both fine beam and rough beam settings. Anyway, we’d like to suggest deferring the discussion on the margin E until the outcome of issue 2-1-2. |
| Apple | We are fine with all proposals above on D, Ginter and E. |
| MediaTek | ok to all proposals in this issue. |
| Ericsson | We are fine with proposals about D, Ginter, but not OK with E.  Agree with Anritsu we do not need additional Y dB in the upper bound as proposed by HW |
| Huawei | We support all proposals to fix the test cases together. |
| Qualcomm | We don’t support adding all these margins together to the requirements. Adding more and more margins will make the test useless.  In the previous meeting we commented that instead of adding more margins to the test requirements (even more margins may be added to the conformance test by RAN5) it would be better to modify the test case to eliminate sources of uncertainty.  E.g. instead of adding a nominal margin -X based on requirements (which Huawei argues does not work), could we measure the actual difference in beam gains at the two AoAs and compensate for that difference. One idea would be to compare EIS measurements (made by the TE, not the UE) at the two AoAs and use the difference as a proxy for the gain difference, including gain difference across bands. There would be some error due to differences in noise figure but the uncertainty could be reduced substantially compared to the margins being proposed here.  Another example we proposed before is to modify the way the AoAs are selected to eliminate the fator D.  We would be open to discussing other modifications to the test procedure to eliminate sources of uncertainty. |
| MediaTek | Regarding QC’s suggestion on a new test methodology, we think it could be one way to resolve the issue, but it would take some time to discuss the detail, which may not be feasible for this Rel-15 performance part issue. An Rel-18 proposal sounds a better approach to us. |

## Companies views’ collection for 1st round

### Open issues

### CRs/TPs comments collection

1. Cat-A draftCRs are not listed for comments.

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2203563 (Anritsu) | Reduction of allocated RBs for CSI-RS based RLM TC in FR2 R15 |
| Ericsson: OK |
| R&S: Should also the OCNG pattern be restricted to the CORESET BW? Means change from OP.2 to OP.5? |
| R4-2203564 (Anritsu) | Reduction of allocated RBs for CSI-RS based RLM TC in FR2 R16 |
| Ericsson: OK |
| R&S: Should also the OCNG pattern be restricted to the CORESET BW? Means change from OP.2 to OP.5? |
| R4-2203565 (Anritsu) | Reduction of allocated RBs for CSI-RS based RLM TC in FR2 R17 |
| Ericsson: OK |
| R&S: Should also the OCNG pattern be restricted to the CORESET BW? Means change from OP.2 to OP.5? |
| R4-2203567 (Anritsu) | Correction on the FR2 inter-frequency relative RSRP accuracy  Moderator: related to 2-1-1 and 2-1-2 |
| Ericsson: OK |
| Huawei: Depends on conclusion of issue 2-1-1 and 2-1-2 |
| Qualcomm: Pending issues 2-1-1, 2-1-2 and 2-1-3. |
| R4-2203570 (Anritsu) | Draft CR to maintain performance requirement |
| Anritsu: Though this draft CR was submitted from us, we’d like to make 2 comments, one is the suggestion to revert changes at A.4.5.6.1.2.2, and the other is a question to the group also for TC A.4.5.6.1.2. It is appreciated if we can hear a view from companies on 2) below.   1. We realized that the changes made to A.4.5.6.1.2.2, i.e. removing the term “DL” from texts, are not appropriate since it’s explicitly mentioned that DL slot boundary shall be used as the start point of BWP switching delay. Thus, we’d like to revert those changes. 2. Related to the reason for change (1), we’d like to clarify if the test case A.4.5.6.1.2 needs a UL CA setting. In this draft CR, we proposed to add UL BWP configurations at Table A.4.5.6.1.2.1-3. The original motivation with the change is to align the configuration with the Table A.6.5.6.1.1.1-3, which is the standalone test case A.6.5.6.1.1 (A.4.5.6.1.2 is NSA TC), and it was previously corrected by R4-2113960 in Aug. 2021. However, considering the test purpose of both A.4.5.6.1.2 and A.6.5.6.1.1, we now assume that the UL BWP configurations are necessary only for PScell (A.4.5.6.1.2) or PCell (A.6.5.6.1.1) and the UL BWP configurations for SCell are not necessary as also proposed on the cover sheet of R4-2113960.   Our new proposed corrections for Table A.4.5.6.1.2.1-3 are as follows.  Also though it is not included in this original draft CR (R4-2203570), the active UL BWP configuration in Table A.6.5.6.1.1.1-3 should also be as follows. |
| Ericsson: OK |
| Huawei: We agree with Anritsu's comments 1) and 2). For 2) we would link to add the following:   * In BWP switching interruption TCs, the PUCCH carrying SCell HARQ ACK/NACKs is the only UL transmission related to SCell and it is sent on PCell/PSCell. So no UL transmission happens on SCell. Configuring UL CA will unnecessarily narrow down the applicability of these TCs. * Furthermore, In current test procedure in 38.533 cl.4.5.6.1.2/6.5.6.1.1. only DL BWP switching is considered.     So we agree UL BWP configuration for SCell is unnecessary. In R4-2113960 we only swap the BWP configurations of SpCell and SCell but forget to remove UL BWP configuration for SCell. It's better to remove them from these two TCs.  For changes (5), we are wondering whether we can modify the test requirements that “… first available uplink resource configured for CSI reporting after…”.  For change (6) and (7), can proponent company clarify more about the restriction in RAN1 spec why the test cannot be performed? |
| Anritsu2: To Huawei Thanks to the comment on the question 2) above. Then we’d like to change the originally proposed correction of UL BWP configuration in A.4.5.6.1 and remove UL BWP configuration for SCell. Also, since the associated changed are made by the previous CR (R4-2113960) also in A.5.5.6.1.2, A.6.5.6.1.1, A.7.5.6.1.1 and A.7.5.6.1.2, we would like to correct them accordingly.  For discussion on change (5), (6) and (7), please allow us to continue the discussion during the 2nd round. |
| Nokia: We agree with update in general except one concern on the change in A.4.5.6.1.2. It is not necessary to add "NR" for NR cells. And for LTE cell, need to keep E-UTRA to indicate it is LTE cell. |
| R4-2203596 (R&S) | Draft CR to TS 38.133: Corrections to active TCI state switch test cases (Rel 15) |
| Anritsu: Numbering of figures are duplicated such as Figure A.5.5.8.1.1.1-1, A.5.5.8.2.1.1-1, A.7.5.8.1.1.1-1, etc. |
| Ericsson: OK |
| R4-2203599 (R&S) | Draft CR to TS 38.133: Corrections to inter-RAT measurement test cases (Rel 15) |
| Ericsson: OK |
|  |
| R4-2203602 (R&S) | Draft CR to TS 38.133: Corrections to intra-frequency event triggered test cases (Rel 15) |
| Anritsu: Changes at CORESET are fine to us. However as for BWP configurations, the initial BWP configuration shall remain as is for the sake of implementation clarity. |
| Ericsson: OK |
| R4-2203802 (Apple) | Draft CR on performance part maintenance for TS38.133 R15 |
| Anritsu: We assume the addition of Es values are not necessary based on the previous discussion for the associated CR (R4-2111865), which are captured in topic summary R4-2115377.  Corresponding texts are excerpted as follows.  **To Huawei** comments from the 1st round. In the RAN5 test specs and TT analysis we have to make a clear distinction between:  - Key parameters, which have an uncertainty value. These must be independent and minimum set  - Derived parameters, which are usually Es/Iot, SSB\_RP and Io.  The Key parameters with an uncertainty value must be independent and minimum set, otherwise the TT analysis process to calculate the overall uncertainty does not work (mathematically invalid).  The derived parameters can all be calculated from the Key parameters. This is what Note 1 is saying “Es/Iot, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves”.  In Test 1, Noc and Es/Noc are the key parameters (parameters settable by the test system). If we specify Noc, Es/Noc and Es in Test 1, they are not a minimum set and it becomes confusing for RAN5 which uncertainties to specify.  In Test 2, Es is the key parameter. When there is no noise, it’s the only one set by the test system.  All the derived parameters are listed in Note 1. |
| Ericsson: OK |
| Apple:  [reply to Anritsu]: Thanks for the clarification! Based on the comment, then we think the Es could be treated as same as SSB\_RP in test 1 and Es in test 1 shall also be included in the Note 2 that,  Note 2: SSB\_RP, Es/Iot, Es in test 1 and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Otherwise, leave the grid as empty is unclear to us. |
| Anritsu2: To Apple. Thanks for the recommendation on the change to Note 2. I agree with the change and update it accordingly. |
| R4-2203831 (QC) | draft Cat-F CR (R15) to PDSCH RMC |
| Anritsu: We have a concern with the change.  RRM RMC already have a restriction of PDSCH scheduling during SMTC duration as stated in Note1.  In many RRM TC like A.6.6.1.2, OnDuration of DRx config for many RRM TCs is scheduled on SMTC duration. Thus in the test cases, the network cannot send any PDSCH under RRM RMC due to confliction of note 1 and note 7. |
| Ericsson: OK |
| Qualcomm:  Thanks Anritsu for the comment, but we don’t see what is the issue here – if the OnDuration and SMTC collide, then the TE can just drop the PDSCH during that time. For these test cases, we only have a dummy PDSCH schedule which is not very relevant for the outcome of the test. |
| Anritsu2: To Qualcomm  I noticed RLC ACK for Measurement report would be on PDSCH.  The missing RLC ACK by TE may cause retransmission of Measurement report by UE (but note that this does not cause degradation of test results, since TE should pick fastest one for evaluation of reporting delay).  Also *drx-InactivityTimer* can be restarted even by UL grant. So current Note 6 may not realize consistent DRx operation among TE venders, since UL grant policy is not stated explicitly.  Based on above, how do you think about introducing a kind of a following general statement for downlink assignment (DL RMC) and UL grant (UL RMC) as the Note 6?  This statement could resolve the concern of consistent DRx operation among TE venders and could avoid some schedule issue due to the SMTC<-> DRx OnDuration collision.  “In DRx tests it shall be allowed to send PDCCH both for downlink assignment and/or UL grant, only during ([10]ms  -  *drx-InactivityTimer*) from timing when *drx-onDurationTimer* starts, unless otherwise specified in the test case” |
| Qualcomm 3:  Thank Anritsu for the suggestion. It is okay with us. We’ll then update the CR with the note below:  Note 6: When DRX is configured, PDCCH can be scheduled both for downlink assignment and/or UL grant only during ([10]ms - drx-InactivityTimer) from timing when drx-onDurationTimer starts, unless otherwise specified in the test case |
| R4-2203834 (QC) | draft Cat-F CR (R15) to E-UTRAN - NR FR2 interruptions at transitions between active and non-active during DRX in Xsynchronous EN-DC A.5.5.2.x |
| Ericsson: It looks fine for the CR. |
| Huawei: Thanks Qualcomm for providing the analysis. We understand the motivation is to guarantee that the possibility (at least two consecutive PUCCH decoding error + one PUCCH decoding error after PUCCH interrupted by transition between active and non-active DRX during T1) should be as low as possible. Shorten the test duration is the most straightforward approach. But we think formula about P(PUCCH\_misdetection)is not precisely formulating the problem. We also recognize it is hard to find close form solution. So we are fine to with the change of T1 to 6.25 seconds.  Regarding the change of removing the multiple iterations, we think it is assumed that test duration is 33\*T1 and UE may fail the test if there is one consecutive PUCCH misdetection during 33\*T1 as explained in the coversheet. However, from our understanding, it means UE only fail one of the iterations instead of all 33 iterations. So we are wondering if the sentence should be removed. |
| R4-2203840 (QC) | draft Cat-F CR (R15) to SCell Activation Test Cases |
| Anritsu: We would like QC to check our CR (R4-2203570) whether the associated proposal can work. We assume the description in the current specification is correct and there are already descriptions to send CSI Report at the timing after m+k from Scell activation. We have a similar comment to Rel-16 CR R4-2203847. (in topic group #202) |
| Ericsson: Depends on the discussion on CR 3837. |
| Qualcomm:  There had been a lengthy discussion in RAN1 around this ambiguous description in RAN4 spec. After the lengthy RAN1 discussion on this matter, no conclusion was reached in terms of whether and what to change, rather it was decided to leave the ambiguity without further clarification in any spec. Therefore, no report OOR during SCell activation shall not be a criterion that determines UE requirement pass vs. fail.  Excerpt from R1-2112685 “Summary of [107-e-NR-7.1CRs-10] Issue#17 Discussion and clarification on CSI report during SCell activation”  **Question #1: Do you agree that we should follow RAN4 specification, i.e., 38.133, in terms of UE CSI reporting during SCell activation**   * **Note: The SCell activation discussed here is the time from the slot specified in clause 4.3 of TS 38.213 to the time when UE completes the SCell activation, i.e., reports a valid CQI** * **Note: RAN4 specification requires UE to report special CSI, i.e., Out of Range (OOR) for CQI and lowest valid SS-RSRP range for L1-RSRP, as specified in 38.133**   From Chair  **Since there is no conclusion or specification change from this email thread (and I expect no further discussions in future meetings), we close this email thread and reject R1-2111846** |
| Huawei: We think this is related to the discussion in core part. Suggest to wait for the conclusion. |
| Nokia: This CR needs more discussion, it will depend on the discussion in R4-2203837 in core requirements. We do not necessarily agree that it is necessary to remove the text as UE is assumed reporting OoR. This can be argued as not being reporting |
| R4-2203892 (CATT) | Draft CR on radio link monitoring test cases |
| Anritsu: Could CATT give a little more explanation with the issue? We have a precedent of PASS data with the original time duration. |
| CATT: To Anritsu: according to the core part, this test case is no DRX. Mout = 20. TCSI-RS = 20ms. There is gp0 and P = 2. It caused 20\*2\*20+40=840. In current specification, it is 440 which mean 400+40. 400=X\* TCSI-RS （20） I don’t know why X=20 here. When we track the spec history, there is no explanation. But according to the core part, we think it is 840.   |  |  |  |  | | --- | --- | --- | --- | | CSI-RS for RLM | Config 1 |  | Resource #4 in TRS.1.1 FDD | | Config 2 |  | Resource #4 in TRS.1.1 TDD | | Config 3 |  | Resource #4 in TRS.1.2 TDD |   Table 8.1.3.2-1: Evaluation period TEvaluate\_out\_CSI-RS and TEvaluate\_in\_CSI-RS for FR1   |  |  |  | | --- | --- | --- | | Configuration | TEvaluate\_out\_CSI-RS (ms) | TEvaluate\_in\_CSI-RS (ms) | | no DRX | Max(200, Ceil(Mout×P)×TCSI-RS) | Max(100, Ceil(Min×P) × TCSI-RS) | |
| Ericsson: OK |
| Qualcomm: Please provide a further elaboration on 80m in T2 and T3 and 40ms in D1  CATT: 40ms in D1 reflects 8.1.5 requirements of 40ms. For example, in A.6.5.1.1, D1 440=400+40ms, in LTE test case ,240=200+40ms. For T2 and T3, keep the same margin as all other test cases. |
| R4-2204371 (MTK) | CR for the RRC based BWP switch test case in EN-DC for R15 |
| Ericsson: OK |
|  |
| R4-2204844 (HW) | Correction of R15 FR1 test cases and RMCs\_R15 |
| Ericsson: If companies accept to move [] from [2400]ms for SCell activation, ok to change measCycleSCell from 320ms to 640ms. |
| Nokia: OK |
| R4-2204847 (HW) | Correction of R15 FR2 test cases and RMCs\_R15 |
| Ericsson: Table A.7.6.1.1.1-3 and Table A.7.6.1.3.1-3: Applicable configuration for cellIndividualOffset should be 1-2 (not 1-4). |
| R&S:   1. We are concerned in defining” Correlation Matrix and Antenna Configuration 2x2 Low” for RLM and BFD-LR test cases:   1a) In an OTA testing environment, the Antenna Correlation cannot be controlled by the TE  1b) In LTE the MIMO for RLM was used for PDCCH robustness (TX-Diversity), in NR there is not such an implicit scheme of PDDCH transmission when 2Tx antennas are used. In addition, the PDCCH and PDSCH reception is not relevant for RLM and BFD-LR test cases.  1c) These test cases are based on SSB and CSI-RS measurements. Each SSB and each CSI-RS is using only one antenna port. It is unspecified (from RAN1) how this single antenna port can be mapped to multiple transmit antennas. Depending on the signal-phase relationship between the two antennas, this might lead to uncontrollable signal polarization.  1d) Thus, we think all SSBs/CSI-RSs shall be mapped to a single transmission antenna. FR2 MIMO makes sense only in case of multiple layer transmission, and this is not the case for RLM and BFD-LR test cases.   1. Since the CR is cleaning up also BFD-LR TCs:   2a) We propose to remove the redundant T4 = 0s, which seems to be a copy-paste configuration from RLM In-Sync test cases  2b) We are wondering what is the reason for having in A.5.5.5.2 configurations SCS 120kHz only in combination LTE-FDD and SCS 240kHz only in combination LTE-TDD. Also A.5.5.5.3 and A.5.5.5.3 do not have any configuration with LTE-TDD. |
| R4-2205073 (Ericsson) | draft CR: Correction of SA RRC re-establishment tests in FR2 Rel-15 |
| Nokia: OK |
|  |
| R4-2205074 (Ericsson) | draft CR: Correction of SA RRC re-establishment tests in FR2 Rel-16 |
| Nokia: 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.*

|  |  |
| --- | --- |
|  | **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”* |

# Recommendations for Tdocs

## 1st round

**New tdocs**

|  |  |  |
| --- | --- | --- |
| **Title** | **Source** | **Comments** |
| WF on … | YYY |  |
| LS on … | ZZZ | To: RAN\_X; Cc: RAN\_Y |
|  |  |  |

**Existing tdocs**

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

Annex

Contact information

|  |  |  |
| --- | --- | --- |
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Note:

1. Please add your contact information in above table once you make comments on this email thread.
2. If multiple delegates from the same company make comments on single email thread, please add you name as suffix after company name when make comments i.e. Company A (XX, XX)