Email discussion [R16\_NR\_RRM]

# Topic #1: Rel-16 NR RRM Enhancements WI

## Initial comments

**Topic 1-1: Revised WID (RP-201112)**

* Background: Revised WID RP-201112 proposes to remove “Non-simultaneous UL carrier operation in FR2” objective from WID
* Companies are encouraged to give input on the need for such a modification.

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| **Company Name** | **Comments** |
| Qualcomm | Revised WID is ok. |
| CATT | Ok with the Revised WID. |
| NTT DOCOMO | The proposed revision looks O.K to us |
| ZTE | WID revision is fine. |
| vivo | Ok with revised WID |
| Intel | We support the revision. |
| Nokia | The revised WID and removal of “Non-simultaneous UL carrier operation in FR2” objective are ok and it is aligned with the corresponding update to the FR2 UE RF WID |
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**Topic 1-2: Exception sheet (RP-201113)**

* Background: Exception sheet provides a full list of remaining open issues.
* Companies are encouraged to provide comments whether the exception sheet includes all the remaining open issues, or anything is missing.

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| **Company Name** | **Comments** |
| Qualcomm | Exception sheet is inclusive of all remaining open issues. |
| vivo | Exception sheets provides a full list of remaining open issues. |
| Intel | Exception sheet lists all the remaining open issues. It is OK. |
| Nokia | All the open items should be kept in the exception sheet as proposed |
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**Topic 1-3: Down-scoping and prioritization of the remaining open issues (RP-201099, RP-201114)**

* Background: RP-201099, RP-201114 provide proposals on possible down-scoping of the WI remaining issues.
* Companies are encouraged to provide views on:
* Companies are encouraged to provide views on:
  + Whether any of the issues below shall be down-scoped in Rel-16 and postponed to Rel-17?
    - Issue 1: UL spatial relation change requirement for BC bit-0 UE
    - Issue 2: SRS carrier switching requirement for inter-band FR2 CA
    - Issue 3: Multiple SCell activation/deactivation requirement in FR2 inter-band CA
    - Issue 4: RRM requirements for CBM in FR2 inter-band CA
    - Other issues to be down-scoped
  + How to handle the remaining open issues in case they are not down-scoped in RAN 88e and not finalized in Aug 2020?

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| Company Name | Comments |
| Huawei | For RRM requirements for CBM in FR2 inter-band CA, we hope a conclusion shall be draw in R16.  The following items can be put in Rel-17   * Requirement for BC bit-0 UE in 2. UL spatial relation change   Multiple SCell activation/deactivation in FR2 inter-band CA |
| Qualcomm | Issue 1: UL spatial relation change   * Requirement for BC bit-0: ok to defer to R17 * Whether UE should meet initial Tx timing accuracy requirements after UL spatial relation switch: ok to defer one-shot timing accuracy to R17   Issue 2: SRS carrier switching for inter-band FR2 CA:   * Interruption requirements for inter-band and case 1/2/3: ok to defer to R17. Have to wait for RF conclusion anyways.   Issue 3: Multiple SCell activation/deactivation in inter-band FR2 CA   * Ok to defer to R17 for CBM UEs  given the current state of MRTD discussion for CBM   Issue 4: RRM requirements for CBM in inter-band FR2 CA:   * Ok to defer to R17 for CBM UEs  given the current state of MRTD discussion for CBM   Other issues to defer to R17:   * BWP switching on multiple CCs: RRM requirement for partial overlapped timer-based BWP switching on multiple CCs is not essential for R16   How to handle the remaining open issues in case they are not down-scoped: revisit the remaining issues in RAN#89-e and decide. |
| NTT DOCOMO | We're fine to down-scope Issue 2 to 4.  On Issue 1, if it is down-scoped, the signalling bit itself should be removed |
| Apple | Most of remaining open issues have been discussed for many meeting cycles with no compromise from either sides. It would be less likely they can be easily resolved beyond Aug. meeting. It is suggested no further extension in RAN#89e and drop all unsolved issues from the WI scope. Some special cases can be considered in TEI but the bar should be high. To be more focused in RAN4#96e, the follow items are suggested to down scope from WI in RAN#88e.   * Requirement for BC bit-0 UE * Interruptions for inter-band SRS carrier switching in FR2 are waiting for RF room conclusion * Multiple SCell activation/deactivation in FR2 inter-band CA    On CBM, we should follow the WF in RAN4#95e. |
| MTK | Issue 1: UL spatial relation change requirement for BC bit-0 UE   * Requirement for BIT-0 UE can be postponed to R17. * Whether UE should meet initial transmit timing accuracy requirements should be removed from R16, since RAN4 already agreed not to introduce one-shot timing adjustment requirement in R16.   Issue 2: SRS carrier switching requirement for inter-band FR2 CA   * Interruptions for inter-band SRS carrier switching in FR2 can be postponed to R17. Since   Issue 3: Multiple SCell activation/deactivation requirement in FR2 inter-band CA   * OK to be postponed to R17   Issue 4: RRM requirements for CBM in FR2 inter-band CA   * OK to be postponed to R17   One question: does this also include MRTD requirement? |
| OPPO | Issue 2: SRS carrier switching requirement for inter-band FR2 CA  Issue 3: Multiple SCell activation/deactivation requirement in FR2 inter-band CA  Issue 4: RRM requirements for CBM in FR2 inter-band CA  Ok to defer to R17 for issue 2/3/4 considering RF progress on FR2 inter-band CA |
| ZTE | Issue 1: UL spatial relation change   * Requirement for BC bit-0: Fine to move to R17 * Whether UE should meet initial Tx timing accuracy requirements after UL spatial relation switch: We think it is important to ensure uplink transmit timing following QCL-ed DL-RS after UL spatial relation switch. The DL receiving timing of QCL-ed DL-RS could be much different than cell timing reference. Without adjusting uplink timing accordingly the gNB demodulation performance could be degraded significantly.   In addition this is different from one shot timing adjustment discussion, which was mainly to handle active TCI state switch and UE autonomous RX beam switch. We don't think UL spatial relation switch was covered by one shot timing adjustment discussion.  So our preference is to have some technical discussion on this in the Aug. meeting. If there is no consensus, it should be moved to R17 WIs.  Issue 2: SRS carrier switching for inter-band FR2 CA:   * It is dependent on RF conclusion. If there is no possbility to have any conclusion in RF room in Aug. meeting then it it fine to move to R17.   Issue 3: Multiple SCell activation/deactivation in inter-band FR2 CA   * Ok to move to R17   Issue 4: RRM requirements for CBM in inter-band FR2 CA:   * Ok to move to R17   How to handle the remaining open issues in case they are not down-scoped:  Move to R17 if no conclusion in Aug. meeting. |
| vivo | Issue 1: UL spatial relation change requirement for BC bit-0 UE   * Ok for BIT-0 UE to be postponed to R17.   Issue 2: SRS carrier switching requirement for inter-band FR2 CA   * Interruptions for inter-band SRS carrier switching in FR2 : ok to be postponed to R17.   Issue 3: Multiple SCell activation/deactivation requirement in FR2 inter-band CA   * OK to be postponed to R17   Issue 4: RRM requirements for CBM in FR2 inter-band CA   * OK to be postponed to R17 |
| Intel | * Whether any of the issues below shall be down-scoped in Rel-16 and postponed to Rel-17?   + Issue 1: UL spatial relation change requirement for BC bit-0 UE   + Issue 2: SRS carrier switching requirement for inter-band FR2 CA   + Issue 3: Multiple SCell activation/deactivation requirement in FR2 inter-band CA   + Issue 4: RRM requirements for CBM in FR2 inter-band CA   + Other issues to be down-scoped   Intel: we are fine to the down-scoping of issue 1~4 above.   * How to handle the remaining open issues in case they are not down-scoped in RAN 88e and not finalized in Aug 2020?   Intel: we should try to complete the other remaining open issues as much as possible. The decision can be made in RAN#89e. |
| Nokia | No down-scope now as many Rel-16 requirements areas have not been progressing sufficiently well and more time for completing Rel-16 is needed for many WID. FR2 UE RF work also need to continue in the August meeting and the discussion of RF and RRM topics should be coordinated in the August meeting. The need for down-scoping should be checked again in the September RAN. |
| Moderator (Intel) | Based on feedbacks there is a common understanding that current exception list is complete RP-201113 and needs to be revised to remove down-scoped objectives  **Proposal: Revise RP-201113 (Intel, ZTE, Apple) to include updated list of open issues based on Topic 1-3** |
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## Intermediate moderator summary (Tue June 30th)

**Topic 1-1: Revised WID (RP-201112)**

* Based on comments there is a common understanding that revised WID RP-201112 is agreeable
* **Proposal 1: Approve RP-201112**

**Topic 1-2: Exception sheet (RP-201113)**

* Based on comments there is a common understanding that current exception list is complete RP-201113 and needs to be revised to remove down-scoped objectives
* **Proposal 2: Revise RP-201113 (Intel, ZTE, Apple) to include updated list of open issues based on Topic 1-3 (if any further down-scoping is agreed)**

**Topic 1-3: Down-scoping and prioritization of the remaining open issues (RP-201099, RP-201114)**

* Issue 1: UL spatial relation change requirement for BC bit-0 UE
  + Majority companies prefer to remove issue 1. One company suggests to remove signalling if the objective is removed. One company prefers no down-scoping.
    - Remove: Huawei, QC, Apple, MTK, ZTE, vivo, Intel
    - Keep: Nokia
    - DCM: if it is down-scoped, the signalling bit itself should be removed
  + Further clarifications from Nokia are encouraged in the next round since the open issue is not related to FR2 inter-band CA.
  + Further clarifications from DCM are encouraged on details of proposal the next round (i.e. from which release the signalling shall be removed).
  + Companies are encouraged to provide views on how to handle BC bit-0 signalling
  + Based on company’s feedback recommend follow the majority view and remove the open issue and further discuss the signalling aspect. Alternative approach is to deprioritize discussion in RAN4 #96e.
  + **Proposal 3:** 
    - **Do not define requirements for Issue 1 in Rel-16 and remove open issue from the exception sheet**
    - **Further discuss whether any impact on BC bit-0 signalling**
* Issue 2: SRS carrier switching requirement for inter-band FR2 CA
  + Majority companies prefer to remove issue 2 from the exception sheet. Two companies propose to continue discussion in Aug meeting.
    - Remove: QC, Apple, DCM, MTK, OPPO, vivo, Intel
    - Keep: Nokia, ZTE
    - ZTE: It is dependent on RF conclusion. If there is no possibility to have any conclusion in RF room in Aug meeting then it is fine to move to R17.
  + Further clarifications from ZTE and Nokia are encouraged on how the open issue can be resolved in RAN4 #96e (e.g. even if RF session reaches the conclusion, RRM room may not have time to conclude).
  + Recommend follow the majority view and remove the open issue. Alternative approach is to deprioritize discussion in RAN4 #96e.
  + **Proposal 4: Do not define requirements for Issue 2 in Rel-16 and remove open issue from the exception sheet**
* Issue 3: Multiple SCell activation/deactivation requirement in FR2 inter-band CA
  + Majority companies prefer to remove Issue 3 from the exception sheet. One company prefers no down-scoping.
    - Remove: Huawei, Apple, DCM, MTK, OPPO, ZTE, vivo, Intel
    - Keep: Nokia
  + Further clarifications from Nokia are encouraged on how the open issue can be resolved in RAN4 #96e (e.g. even if RF session reaches the conclusion, RRM room may not have time to conclude).
  + Recommend follow the majority view and remove the open issue. Alternative approach is to deprioritize discussion in RAN4 #96e.
  + **Proposal 5: Do not define requirements for Issue 3 in Rel-16 and remove open issue from the exception sheet**
* Issue 4: RRM requirements for CBM in FR2 inter-band CA
  + Summary of initial round comments: Majority of companies prefer to remove Issue 4. Three companies prefer to continue discussion in Aug.
    - Remove: DCM, MTK, OPPO, ZTE, vivo, Intel
    - Keep: Huawei, Nokia
    - Apple: follow WF in RAN4 #95e
    - MTK: does this apply to MRTD?
      * Moderator: technically MRTD is in scope of FR2 RF WI and Issue 4 does not apply.
  + Recommend continue discussion to identify possible compromise (e.g. deprioritize selected sub-issues related to CBM)
  + **Proposal 6:** 
    - **Option 1: Do not define requirements for Issue 4 and remove from the exception sheet.**
    - **Option 2: Continue discussion in RAN4 #96e for Issue 4. In case the requirements are not finalized in RAN4 #96e, no Rel-16 requirements will be introduced.**
      * **Note: based on WF mentioned by Apple**
    - **Option 3: Deprioritize work on a subset of CBM related requirements (e.g. beam management, scheduling restriction, measurement restriction, SCell activation delay, interruption)**
      * **Note: see details of open issues in R4-2008998**
* Issue 5: Whether UE should meet initial Tx timing accuracy requirements after UL spatial relation switch
  + Additional issue was identified during the discussion
  + 2 companies suggest to deprioritize this and 1 company to keep
    - Remove: QC, MTK
    - Keep: ZTE
  + **Proposal 7: Continue discussion and collect other companies’ views**
* Issue 6: BWP switching on multiple CCs: RRM requirement for partial overlapped timer-based BWP switching on multiple CCs
  + Additional issue was identified during the discussion
  + 1 company suggests to deprioritize this
  + **Proposal 8: Continue discussion and collect other companies’ views**
* How to handle the remaining open issues in case they are not down-scoped?
  + Diverse views among the companies were observed.
  + **Proposal 9: Postpone discussion on handling non-down-scoped issues to Sep.**

## Intermediate summary comments

**Moderator: Companies are encouraged to provide comments on the proposals and questions intermediate summary in Section 1.2 in the table below**

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| Company Name | Comments |
| Ericsson | On issues 1, 2, 3 and 5) we are fine to down scope.  On issue 4:  In our view MRTD discussed under RF requirements for FR2 is related to issue 4 since this is all about inter-band CA FR2. So if option 1 or option 3 is agreed then we should also defer MRTD discussion to Rel-17. In that case MRTD which is an RRM issue and not RF, should be under RRM enhancement WI.  On issue 6: we do NOT agree to down prioritize, “RRM requirement for partial overlapped timer-based BWP switching on multiple CCs”. RAN4 has made considerable progress on BWP switching on multiple CCs for all cases and we expect all requirements can be completed in August. The scenarios for which partial overlap BWP switching are already very limited. |
| Apple | OK with proposals in Topic 1-1 and 1-2  Issue 1/2/3/5 in Topic 1-3: support the propsals to downscope  Issue 4 in Topic 1-3: we support option 2 and follow the agreements in RAN4#95e. Since CBM related MRTD discussion is under FR2 RF WI, it is proposed not to discuss CBM related other RRM requirements in the 1st round discussion in RAN4#96e under RRM enh. WI.  Issue 6 in Topic 1-3: We support to deprioritize this as the conditions are getting very diverse (too many cases to define, FR combinations, UE support of per FR gap)  and in general partial overlap switch should not be allowed |
| Intel | Issue 1, 2 and 3: support proposals from moderator.  Issue 4: considering only one e-meeting left and lack of progress in other topic, we prefer option 1. Regarding MRTD, in our view it is in scope of FR2 RF WI. We suggest not to discuss this in this WI.  Issue 5: we prefer not to discuss this anymore in R16. We don’t even consider this as ‘down-scoping’. Actually, it is not in the scope from the beginning. there was not discussed until the last RAN4#85e. Moreover, UE is not mandated to update the timing when UL spatial relation info changes (at least not for all the cases).  Issue 6: we support to deprioritize partial overlapped timer-based BWP switching on multiple CCs. We believe in CA this can be avoided by configuring timers correctly. As for dual connectivity operation, we can consider it as corner case. |
| MTK | Issue 1, 2, 3, 4, 5: OK to down scope  Issue 6: OK to deprioritize requirement for partial overlapped Time-based BWP switches. Timer is expired because UE already receives no DL/UL grant for a certain period of time. In this case, there is no urgency to ask UE to switch BWP fast nor to define requirement for it.  About MRTD for issue 4: All RRM baseline requirements for inter-band FR2 CA should be considered as a package. Otherwise, the whole functionality is not complete. If we now decided to postpone all RRM requirements for CBM in FR2 inter-band CA, then it make less sense to still work on MRTD part. |
| Huawei | Topic 1-1: We are OK to approve RP-201112.  Topic 1-2: We are OK to revise RP-201113 to include the updated list of open issues based on Topic 1-3.  Topic 1-3:  For UL spatial relation change requirement for BC bit-0 UE, we support proposal 3.  For SRS carrier switching for FR2, we support proposal 4.  For Multiple SCell activation/deactivation in FR2, we support proposal 5  For RRM requirements for CBM in FR2 inter-band CA, our preference is Option 2 in proposal 6, i.e., continue discussion in Rel-16. In case the requirements are not finalized in RAN4 #96e, no Rel-16 requirements will be introduced.  For initial Tx timing accuracy, we support “remove”.  For BWP switching on multiple CCs, the scenarios for the issue are limited after the discussion in the last RAN4 meeting. We expect the issue can be resolved in the August meeting.  Regarding how to handle the remaining open issues in case they are not down-scoped, we are OK with proposal 9. |
| vivo | Topic 1-1 and 1-2: ok with proposed proposals  For Topic 1-3,  For Issue 1, 2, 3, same comments as we proposed at the first round and support the proposals from moderator.  For issue 4, the down scope maybe not straightforward due to the involvement of MRTD discussion. However considering the current RAN4 working load we slightly prefer option 1.  For issue 5, we are ok to down scope.  For issue 6, ok to deprioritize partial overlapped timer-based BWP switching on multiple CCs. |
| ZTE | Issue 1: okay with P3  Issue 2: If there were conclusion in RF session, it would be straightforward to specify RRM requirements by revising CR since the principle of specifying interruption requirements is in place. What is needed is the SRS carrier based switching timing for FR2 inter-band CA. As far as we know, it seems there is no such discussion in RF room. So we are fine with P4.  Issue 3: okay with P5  Issue 4: Though MRTD is discussed in another email, RRM requirements for CBM in FR2 inter-band CA are highly relevant to outcome of MRTD discussion. Considering one meeting left, it seems not possible complete the work in one meeting. So option 1 is fine. Option 3 is not preferable to have limited requirements.  Issue 5: In addition to reasons provided in the 1st round, we would like to point out that some candidate options for UL spatial relation switch delay requirements including timing tracking delay. There are also open issues to discuss whether time tracking is needed for some cases. If uplink transmit timing is not adjusted based on DL-RS, then it seems no point of downlink timing tracking of QCL-ed DL-RS. So we see the point to have further discussion in RAN4, together with other open issues.  If in the end no consensus can be reached, then it should be specified at least in R17.  Issue 6: We prefer to have the RRM requirements for this partial overlapped case in Rel-16. |
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# Topic #2: Rel-16 NR L3 CSI-RS measurements WI

## Initial comments

**Topic 2-1: Revised WID (RP-200921)**

* Companies are encouraged to give input whether a revised WID is agreeable.

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| Company Name | Comments |
| Qualcomm | We are fine with the minor changes. |
| ZTE | Fine with the WID revision. |
| Intel | The revision is OK. |
| Huawei | We would like to keep 38306 and 38331 as impacted specifications. New UE capabilities for CSI-RS measurement have not been excluded, and we even have two new capabilities in [] in the RAN4 feature list from RAN4#95 (R4-2009174) |

**Topic 2-2: Exception sheet (RP-200920)**

* Background: Exception sheet provides a full list of remaining open issues.
* Companies are encouraged to provide comments whether the exception sheet includes all remaining open issues or anything is missing.

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| Company Name | Comments |
| Qualcomm | This RP is for RRM enhancement not CSI-RS L3, which should be [RP-200920](http://www.3gpp.org/ftp/TSG_RAN/TSG_RAN/TSGR_88e/Docs/RP-200920.zip), in which the open issues are completely listed. |
| CATT | Yes, exception is in RP-200920. |
| Intel | RP-200920 is OK. |

**Topic 2-3: Down-scoping and prioritization of the remaining open issues (RP-201230, RP-201099)**

* Background: RP-201230, RP-201099 provide proposals on possible down-scoping and prioritization of the WI remaining issues.
* Companies are encouraged to provide views on:
  + Whether any of the issues below shall be down-scoped in Rel-16 and postponed to Rel-17?
    - Issue 1: CSI-RS configuration applicability
    - Issue 2: Necessity to define requirements for {D=1 with PRBs ≥ 96}
    - Issue 3: New UE capability on the simultaneous reception of CSI-RS of neighbour cell and SSB of serving cell
    - Issue 4: New UE capability on minimum separation between two slots with CSI-RS resources
    - Issue 5: CMTC for CSI-RS L3 measurement and time-restriction restriction on CSI-RS resources configuration
    - Issue 6: Scheduling restriction and measurement restriction for CSI-RS measurement
    - Other?
  + How to handle the remaining open issues in case they are not down-scoped in RAN 88e and not finalized in Aug 2020?

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| Company Name | Comments |
| Huawei | For “CSI-RS configuration applicability: whether to define requirements for {D=1 with PRBs ≥ 96” a conclusion should be drawn in Rel-16 that the configuration is forbidden.  For “Whether or not to introduce new UE capability for minimum separation between two slots with CSIRS resource”, the separation is needed in Rel-16 since UE needs the processing time.  The following items can be put in Rel-17  The collision case between L1 measurement of serving cell and CSI-RS L3 measurement of neighbour cell |
| CMCC | Issue 1 and issue 2 seems to be the same issue.  Issue 1-5, we are OK to down scope them in Rel-16 and postpone to Rel-17.  For Issue 6 “Scheduling restriction and measurement restriction for CSI-RS measurement”, it is necessaary to specify the related requirements in Rel-16. In detail, issue 6 includes three parts: mixed numerology of serving data and CSI-RS L3 mobility, CSI-RS intra-f measurement in TDD band, RX beam sweeping. All of thses need to be considered and specify UE behaviour in Rel-16 to guarantee the system performance. And the scheduling restriction specified for SSB can be used as baseline to save RAN4 efforts. |
| Qualcomm | Issue 1: CSI-RS configuration applicability  Issue 2: Necessity to define requirements for {D=1 with PRBs ≥ 96}   * {D=3 with PRB>=48} is the majority agreed configuration for Rel-16. The above configuration is not essential for R16 and is ok to defer to R17.   Issue 3: New UE capability on the simultaneous reception of CSI-RS of neighbour cell and SSB of serving cell   * we prefer to keep the discussion on this in Rel-16 and hope a conclusion can be reached in RAN4#96-e.   Issue 4: New UE capability on minimum separation between two slots with CSI-RS resources   * agree to continue discussing in Rel-16 to address the concern in the UE processing timeline to deal with back to back CSI-RS L3 slots..   Issue 5: CMTC for CSI-RS L3 measurement and time-restriction restriction on CSI-RS resources configuration   * CMTC specification depends on other WGs which are officially finished in Rel-16 so we agree to postpone it to Rel-17.   Issue 6: Scheduling restriction and measurement restriction for CSI-RS measurement   * Prefer to continue discussing in Rel-16 as it affects the UE implementation.   Other issues to be down-scoped  whether UE is required to perform Rx beam sweeping for CSI-RS based L3  measurement can be down-scoped or postponed to Rel-17 as it requires further discussions/complexity in UE specific to FR2, e.g. the processing delay w.r.t whether to sweep the UE Rx beams.  How to handle the remaining open issues in case they are not down-scoped in RAN 88e and not finalized in Aug 2020?  revisit the remaining issues in RAN#89-e and decide. |
| CATT | As the rapporteur company of this WI, we could understand the willing to do more work for this WI in Rel-16. However considering the remaining work and low efficient of E-meeting, the top priority now is to ensure Q3 discussion is focused as much as possible so that we can complete this WI in a timely manner in Rel-16.To this end, I propose to consider a minimum set of exception list and do further enhancement in Rel-17 for others.  As shown in our paper RP-201230, we are ok to have further discussion for issue 1-5 in Rel-17. And it seems Issue 3 have already converged to majority views in May meeting. maybe we can have a try for issue 3. |
| Apple | All issues listed can be down scoped from Rel-16 WI as proposed in RP-201099. For issue 5, it is important to introduce this feature. However, due to time limitation, we are OK should be postponed to Rel-17 since time domain restriction has been agreed in the last RAN4 meeting |
| MTK | Issue 1: CSI-RS configuration applicability   * This item is not very clear to us. Some clarification is needed   Issue 2: Necessity to define requirements for {D=1 with PRBs ≥ 96}   * Remove this from exception sheet. This issue has been discussed several meetings without conclusion, while there is already a majority view on {D=3 with PRBs ≥ 48}   Issue 3: New UE capability on the simultaneous reception of CSI-RS of neighbour cell and SSB of serving cell   * This one is not controversial and can be kept.   Issue 4: New UE capability on minimum separation between two slots with CSI-RS resources   * Keep in Rel-16 is OK, although we are not 100% confident if conclusion can be reached in Aug.   Issue 5: CMTC for CSI-RS L3 measurement and time-restriction restriction on CSI-RS resources configuration   * Time domain restriction is a prerequisite to discuss CSSF within gap requirement. We can agree to have **no new signaling for CMTC**, but a certain time-domain restriction (either re-using SMTC or other signaling) is certainly needed to conclude this WI.   Issue 6: Scheduling restriction and measurement restriction for CSI-RS measurement   * This part is important but certainly there is no sufficient time for discussion. As a compromise, we are OK to postpone it to Rel-17.   Other issues to be down-scoped   * If it is agreed to have no time domain restriction to be specified in R16, then we should also remove inter-frequency requirements in Rel-16. Because the inter-frequency requirements is deeply coupled with time-domain restriction in both CSSF and delay requirement. For intra-frequency requirement, its corresponding CSSF does not depend on any time-domain restriction.   How to handle the remaining open issues in case they are not down-scoped in RAN 88e and not finalized in Aug 2020?  Handled in a R17 RRM basket WI (to be discussed in Sep RP meeting) |
| OPPO | Issue 2: Necessity to define requirements for {D=1 with PRBs ≥ 96}   * FFS in Rel-17 if possible   Issue 3: New UE capability on the simultaneous reception of CSI-RS of neighbour cell and SSB of serving cell   * Agree with CATT that we could have a try in Aug.   Issue 4: New UE capability on minimum separation between two slots with CSI-RS resources   * Also not sure we can reach conclusion in Aug. OK to postpone it to Rel-17.   Issue 5: CMTC for CSI-RS L3 measurement and time-restriction restriction on CSI-RS resources configuration   * OK with CMTC to be postponed to Rel-17, considering time domain restriction has been agreed in last RAN4 meeting.   Issue 6: Scheduling restriction and measurement restriction for CSI-RS measurement   * We could have a try in Aug. If no conclusion then OK to postpone it to Rel-17.   How to handle the remaining open issues in case they are not down-scoped in RAN 88e and not finalized in Aug 2020?  Agree to be handled and decided in Sep RAN meeting |
| ZTE | Issue 1: CSI-RS configuration applicability   * The issue is not clear.   Issue 2: Necessity to define requirements for {D=1 with PRBs≥ 96}   * It is important to define requirments for  {D=1 with PRBs≥ 96} since the overhead issue is quite significant with D=3 for CSI-RS based mobility and usally lager BW may be configured. In addition the interference due to high density CSI-RS for L3  mobility is also a big issue. If this is delayed to R17 there will be legacy UE issue that NW cannot take advantage of D=1. So RAN4 is to define requirements for {D=1 with PRBs≥ 96} in R16.   Issue 3: New UE capability on the simultaneous reception of CSI-RS of neighbour cell and SSB of serving cell   * This can be further discussed in Aug. meeting   Issue 4: New UE capability on minimum separation between two slots with CSI-RS resources   * Move to R17 for further discussion.   Issue 5: CMTC for CSI-RS L3 measurement and time-restriction restriction on CSI-RS resources configuration   * CMTC may be discussed in R17. * When defining RRM requirements, time-restriction on CSI-RS resources configuration can be further discussed in Aug. meeting.   Issue 6: Scheduling restriction and measurement restriction for CSI-RS measurement   * This absolutely should be further discussed in Aug. meeting. At least it needs to figure out what the impact will be if there is no requirements for scheduling restriction and measurement restriction.   How to handle the remaining open issues in case they are not down-scoped:   * Move to R17 if no conclusion in Aug. meeting. |
| vivo | Issue 1-2 Necessity to define requirements for {D=1 with PRBs ≥ 96}:  We prefer down-scoping of this issue to later release.  Issue 3: New UE capability on the simultaneous reception of CSI-RS of neighbour cell and SSB of serving cell.  We are fine to discuss this in R16.  Issue 4: New UE capability on minimum separation between two slots with CSI-RS resources  We are fine to discuss this in R16.  Issue 5: CMTC for CSI-RS L3 measurement and time-restriction restriction on CSI-RS resources configuration  We think time-restriction for CSI-RS should not be moved to R17 since this is already agreed in R16, based on R4-2009009. The details can be discussed and decided in future RAN4 meetings.  On CMTC, it is also agreed in R4-2009009 that is should be discussed in R17.  Issue 6: Scheduling restriction and measurement restriction for CSI-RS measurement  We think this should be within R16 scope and is one basic feature.  How to handle the remaining open issues in case they are not down-scoped in RAN 88e and not finalized in Aug 2020?  We see quite high possibility that the issues that are not down-scoped can not be finished in RAN4  August.  We should discuss them in RAN 89e. Maybe further extension or exception(e.g. square bracket or main-tainence in CR phase) is needed. |
| Intel | * Issue 1: CSI-RS configuration applicability * Issue 2: Necessity to define requirements for {D=1 with PRBs ≥ 96}   OK to defer to R17.   * Issue 3: New UE capability on the simultaneous reception of CSI-RS of neighbour cell and SSB of serving cell   OK to defer to R17. If no UE capability is introduced, is it common understanding that UE is NOT required to handle simultaneous reception of CSI-RS of neighbour cell and SSB of serving cell as baseline?   * Issue 4: New UE capability on minimum separation between two slots with CSI-RS resources   OK to defer to R17. But what’s the baseline assumption for R16 UE?   * Issue 5: CMTC for CSI-RS L3 measurement and time-restriction restriction on CSI-RS resources configuration   OK to defer the concept to R17. But some time domain restriction is still needed.   * Issue 6: Scheduling restriction and measurement restriction for CSI-RS measurement   OK to defer to R17.  How to handle the remaining open issues in case they are not down-scoped in RAN 88e and not finalized in Aug 2020?  Revisit in RANP#89e. |
| Xiaomi | Issue 2: Necessity to define requirements for {D=1 with PRBs ≥ 96}   * OK to defer to Rel-17   Issue 3: New UE capability on the simultaneous reception of CSI-RS of neighbour cell and SSB of serving cell   * This issue is not controversial, it can be further discussed in Aug meeting.   Issue 4: New UE capability on minimum separation between two slots with CSI-RS resources   * OK to postpone to Rel-17, this issue has not been converged according to discussion in previous meetings.   Issue 5: CMTC for CSI-RS L3 measurement and time-restriction restriction on CSI-RS resources configuration   * Considering time domain restriction has been agreed in last RAN4 meeting, not sure it is necessary to introduced it in Rel-17.   Issue 6: Scheduling restriction and measurement restriction for CSI-RS measurement   * Support CMCC’s view, the requirement for scheduling restriction shall be specified in Rel-16. Otherwise, it will impact UE behaviors.   How to handle the remaining open issues in case they are not down-scoped in RAN 88e and not finalized in Aug 2020?   * Similar view as other companies, they can be handled and decided in Sep RAN meeting |

## Intermediate moderator summary (Tue June 30th)

**Topic 2-1: Revised WID (RP-200921)**

* Most companies are ok with Revised WID. One company suggest to keep 38.306 and 38.331 specs in WID
* **Proposal 1: Revise RP-200921 and keep 38.306 and 38.331 specs in WID**

**Topic 2-2: Exception sheet (RP-200920)**

* Common understanding that current exception list is complete RP-200920 and needs to be revised to remove down-scoped objectives
* **Proposal 2: Revise RP-200920 (CATT) to include updated list of open issues based on Topic 2-3 (if any)**

**Topic 2-3: Down-scoping and prioritization of the remaining open issues (****RP-201230, RP-201099)**

* Issue 1: CSI-RS configuration applicability
  + Company views.
    - Remove: CMCC, CATT, Apple
    - Several companies commented Issues 1 and 2 are same
    - MTK/ZTE: clarifications needed
  + CATT is encouraged to provide further clarifications on the opens issue since it comes from RP-201230
* Issue 2: Necessity to define requirements for {D=1 with PRBs ≥ 96}
  + Majority of companies propose to remove this open issue from the exception sheet. One company prefers to keep it and one company suggests to preclude such configuration.
    - Remove: CMCC, QC, CATT, Apple, MTK, OPPO, vivo, Intel, Xiaomi
    - Keep: ZTE (define requirements)
    - Huawei: configuration needs to be forbidden
  + Recommend to follow the majority view and remove the open issue.
  + To ZTE, based on moderators understanding there was a long discussion in RAN4 whether requirements shall be introduced and no consensus was reached.
  + Further clarifications from Huawei are encouraged on how the configuration can be forbidden.
  + **Proposal 3: Do not define requirements for Issue 2 in Rel-16 and remove open issue from the exception sheet**
* Issue 3: New UE capability on the simultaneous reception of CSI-RS of neighbour cell and SSB of serving cell
  + Diverse views and no consensus to remove the open issue from the exception sheet
    - Remove: CMCC, Apple, Intel
    - Keep: QC, MTK, OPPO, CATT(?), ZTE, vivo, Xiaomi
  + **Proposal 4: Keep Issue 3 in exception sheet and further discuss in Aug.**
* Issue 4: New UE capability on minimum separation between two slots with CSI-RS resources
  + Diverse views and no consensus to remove the open issue from the exception sheet
    - Remove: CMCC, CATT, Apple, OPPO, ZTE, Intel
    - Keep: Huawei, QC, MTK, vivo
  + **Proposal 5: Keep Issue 4 in exception sheet and further discuss in Aug.**
* Issue 5: CMTC for CSI-RS L3 measurement and time-domain restriction on CSI-RS resources configuration
  + Company views.
    - Remove: CMCC, QC, CATT, Apple, OPPO, ZTE, vivo, Xiaomi, Intel
    - Keep: MTK, Intel
    - Intel: some time domain restriction is still needed
    - MTK: no new signaling for CMTC but a certain time-domain restriction (either re-using SMTC or other signaling) is certainly needed to conclude this WI
  + Recommend follow the majority view and remove the open issue.
  + Companies are also encouraged to provide alternative options if some part of the Issue 5 can be down-scoped
  + **Proposal 6: Do not define requirements for Issue 2 in Rel-16 and remove open issue from the exception sheet**
* Issue 6: Scheduling restriction and measurement restriction for CSI-RS measurement
  + Diverse views and no consensus to remove the open issue from the exception sheet
    - Remove: CATT, Apple, MTK, Intel
    - Keep: CMCC, QC, OPPO, ZTE, vivo, Xiaomi
  + **Proposal 7: Keep Issue 6in exception sheet and further discuss in Aug.**
* Issue 7: The collision case between L1 measurement of serving cell and CSI-RS L3 measurement of neighbour cell
  + Additional issue identified during the discussion by one company
  + **Proposal 8: Continue discussion and collect other companies’ views on Issue 7**
* Issue 8: Whether UE is required to perform Rx beam sweeping for CSI-RS based L3  measurement
  + Additional issue identified during the discussion by one company
  + **Proposal 9: Continue discussion and collect other companies’ views on Issue 8**
* Issue 9: Remove inter-frequency requirements if issue 5 is removed
  + Additional issue identified during the discussion by one company
  + **Proposal 10: Continue discussion and collect other companies’ views on Issue 9**
* How to handle the remaining open issues in case they are not down-scoped?
  + Diverse views.
  + **Proposal 11: Postpone discussion on handling non-down-scoped issues to Sep.**

## Intermediate summary comments

**Moderator: Companies are encouraged to provide comments on the proposals and questions intermediate summary in Section 2.2 in the table below**

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| --- | --- |
| Company Name | Comments |
| Apple | Issue 1 in Topic 2-3: continue supporting to downscope  Issue 2/5 in Topic 2-3: support the proposal  Issue 3 in Topic 2-3: we can follow the majority view. But this issue hasn’t been very clearly defined in RAN4 discussion. It is still very challenge to reach the agreement.  Issue 3 in Topic 2-3: propose to remove it and follow the majority view  Issue 5: we would like to clarify our position. We have similar view as MTK. We think it is important to introduce CMTC. However, due the time limitation, we can accept to introduce time domain restriction and postpone CMTC discussion to R17. It is proposed to revise proposal6 as “**Time domain restriction on CSI-RS configurations for L3 measurement should be introduced in R16. If so, CMTC related discussion can be removed from exceptional sheet and postponed to R17**.”  Issue 6/7/8: propose to remove them from the exceptional sheet |
| Qualcomm | Issue 5: CMTC for CSI-RS L3 measurement and time-domain restriction on CSI-RS resources configuration  This issue actually can be split into two aspects and require clarifications into following sub-bullets.  1. introduction of CMTC  2. mandating time-domain restriction on CSI-RS resources configuration  For 1, CMTC can be postponed and removed from Rel-16 discussion, which we agree with the majority view.  For 2, we shall allow imposing some time-domain restriction in the configuration. So in this perspective, we shall agree with Intel and MTK.    Issue 7: The collision case between L1 measurement of serving cell and CSI-RS L3 measurement of neighbour cell  Further clarifications are needed too.  If serving cell L1 measurement is SSB based, then this is covered in the scope of issue 3 already.  If serving cell L1 measurement is CSI-RS based, then serving cell L1 measurement based on serving cell timing shall be prioritized, which is similar to the collision case between serving cell data and neighbor cell CSI-RS L3.  So we think further discussions are needed in August. |
| CMCC | Issue 9: Remove inter-frequency requirements if issue 5 is removed  Inter-frequency requirements need to be specified in Rel-16. From mobility point of view, both intra-f measurement and inter-f measurement are necessary. If only intra-f measurement is considered, the feature of CSI-RS based L3 mobility is not completed.  We do not agree with the logic that inter-frequency is removed when CMTC is not considered in Rel-16. Without CMTC, the requirements on inter-f measurement can be specified. Firstly, we share the same view with other companies that even through CMTC is not introduced in Rel-16, it is necessary to consider the time domain limitation when specify the CSI-RS based L3 measurement requirements to reduce UE complexity. Secondly, from our point of view, the time domain limitation can be considered for both intra-f measurement and inter-f measurement. With the time domain limitation in inter-f measurement, the CSSF can also be discussed. |
| CATT | Topic 2-1.  Actually 38.306 and 38.331 has been removed from the WID (RP-191992) based on consensus in RAN#84. However ever wrong version was used for update in in Mar 2020. This is why the 2 specs are back into the WID.  Topic 2-3.  Issue 1，It comes from RP-201230 and it is the same with Issue 2 actually. So Issue 1 can be removed from the discussion.  Issue 4，I agree it is important. But it is not critical for Rel-16 completion. This signaling is a new proposal came to RAN#95e and has never been discussed. Considering the situation and the pressure for Rel-16 completion, We propose to postpone this signaling to Rel-17 based on majority view.  Issue 6, We are fine to have discussion in August meeting as in our paper RP-201230.  Issue 9, even though CMTC is postponed to Rel-17, we don’t need to remove inter-frequency requirements. Side condition/time domain restriction can be considered in Rel-16. |
| Intel | Issue 2/3/4: fine with proposals from moderator.  Issue 5: signaling related discussion can be postponed. But time domain restriction is needed and can be discussed in Aug.  Issue 6: fine with proposal from moderator.  Issue 7: prefer to have agreement on how to handle this collision in R16. |
| MTK | Issue 2: Necessity to define requirements for {D=1 with PRBs ≥ 96  remove {D=1 with PRBs ≥ 96}  Issue 5: CMTC for CSI-RS L3 measurement and time-domain restriction on CSI-RS resources configuration  we would like to provide a revision to the current item on the exception sheet as   * time-domain restriction without new signaling   Issue 7: The collision case between L1 measurement of serving cell and CSI-RS L3 measurement of neighbour cell  With the clarification from QC, we think some part is already included in Issue 3, while the other part can still be postponed.  Issue 8: Whether UE is required to perform Rx beam sweeping for CSI-RS based L3 measurement:  This part is essential to FR2 and should be further discussed in next RAN4 meeting.  Issue 9: Remove inter-frequency requirements if issue 5 is removed  If the consensus is to still have a certain time-domain restriction, then we think it is fine to keep inter-frequency requirement. If there is no any time-domain restriction, then certainly it is not possible to conclude inter-frequency requirement. |
| Huawei | Topic 2-1: Support proposal 1.  Topic 2-2: Support proposal 2.  Topic 2-3:  Issue 1 and Issue 2: We are OK to Proposal 3  Issue 3: OK with proposal 4  Issue 4: OK with proposal 5  Issue 5: proposal 6 is not clear.  We can define some time domain restrictions for CSI-RS configuration without signaling in R-16 (e.g., as side condition). CMTC discussion with RAN1/2 impact can be removed from the exception sheet.  Issue 6: OK with proposal 7  Issue 7: can be removed from the exception sheet.  Issue 8: Rx beam sweeping is an essential functionality. This issue shall be kept in exception sheet and further discuss in Aug.  Issue 9: as we pointed in issue 5, the time domain restriction shall be kept. The inter-frequency requirements can be specified based the time domain restriction of CSI-RS configuration. Thus inter-frequency measurements shall be further discuss in August.  • How to handle the remaining open issues in case they are not down-scoped?  Agree with proposal 11. |
| vivo | Issue 5:  We prefer to finish the details of time domain restriction in R16 without signaling impact.  As discussed and concluded in last RAN4 meeting, CMTC is FFS in R17.  Issue 9:  Currently we do not think removing inter-frequency from scope is necessary to complete the WI. We think it should be allowed to discuss in RAN4 August.  • How to handle the remaining open issues in case they are not down-scoped?  We support Proposal 11. |
| ZTE | Issue 2: We provided use cases and reason in the 1st round. In addition, we don’t see any technical reason not to define requirements for D=1.  QC commented this is not essential. However we think this is essential configuration for CSI-RS based L3 mobility in terms of reducing overhead and interference, which bring significant system performance improvement.  MTK commented this is majority view. We don’t think decision for this issue can just be made based on majority view considering the use cases and technical justification. Besides in RAN4 discussion, there are other companies supporting defining requirements for D=1 configuration.   * Option 1: Yes (NTT DOCOMO, ZTE, Nokia, NEC);   What is the technical concern in terms of defining RRM requirements for this low density configuration?  We are not okay with P3.  Issue 3: okay with P4.  Issue 4: Agree with CATT that this is not necessary to be discussed in Rel-16. We don’t believe this can be done in one meeting. We propose to postpone the discussion to Rel-17, which we could have clearer picture.  Issue 5: Support P6  Issue 6: Support P7  Issue 7: Agree with QC that this can be down-scoped to ‘The collision case between CSI-RS based L1 measurement of serving cell and CSI-RS L3 measurement of neighbour cell’. It can be further discussed in the next RAN4 meeting.  Issue 8: Okay to further discuss in the next RAN4 meeting.  Issue 9: We don’t see why inter-frequency requirements should be removed if no CMTC is introduced. Similar to intra frequency measurement timing restriction can be defined, e.g. within gap. Then there should be no problem to define inter-frequency RRM requirements.  Issue 10: Okay with P11 |
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# Topic #3: Rel-16 NR Positioning WI

## Initial comments

**Topic 3-1: RP-200899 Status report of WI: NR positioning support; rapporteur: Intel Corporation**

* Background: QC raised a flag for SR – “the list of RAN4 open issues is not completely accurate and needs further discussion. Correspondingly, the exception sheet in RP-200900 will need to be updated”
* Q1: Whether any updates to the SR are needed

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| Company Name | Comments |
| Qualcomm | We don’t think “scheduling restrictions for PRS measurements in FR1” is a valid open issue anymore given that PRS measurements are only going to be defined within MG. For the same reason, UE behavior for the case of active BWP switching during PRS measurement is no longer a valid open issue. “report mapping tables” have still open issues for both RSTD and UE Rx-Tx time difference. |
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**Topic 3-2: RP-200900 Rel-16 WI Exception for Core part: NR positioning support**

* Background:
  + E/// raised a flag: “The exception sheet lists, “Report mapping” for RSTD as an open issue. This is related to performance part and should be removed. Core aspects (signaling) are complete and RAN4 already sent LS to RAN2 in RAN4#94-ebis.”
  + MTK raised a flag: “The current scope for Q3 discussion is too wide, including implicitly the impact to Rel-15 L3 measurement. It is challenging to conclude everything in a single E-meeting in Q3. We suggest plenary to discuss possible down scoping or prioritization for this WI.”
  + Intel submitted a discussion paper RP-201117 with the views on the remaining RAN4 open issues handling for Rel-16 NR Positioning WI
* Q1: Whether the exception sheet includes all remaining open issues, or any updates or downscoping needed?

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| Company Name | Comments |
| Ericsson | On exception sheet: our view is that report mapping specification work in 38.133 being part of section 10 is clearly a performance part and should not be listed as core part. RAN4 has well defined separation between core and performance aspects which should be followed.  On down scoping: We do NOT agree to down scope any of the items listed in the exception sheet (RP-200900). These are also essential elements which need to be completed. If any issue is not completed in August then this should be discussed in Sept plenary. So in our view the current exception sheet is fine except report mapping (that is part of performance as stated above) needs to be removed. |
| Apple | We support the proposal to complete the following RAN4 open issues for NR Positioning WI in R16:  • PRS RSTD measurement requirements  • UE Rx-Tx time difference measurement requirements  • PRS RSRP measurement requirements  •    Active BWP switch during positioning measurement  We support to downscope the following RAN4 open issues from exceptional sheet:   * New measurement gap patterns for non-positioning related RRM: We propose to only use new MG pattern dedicatedly for positioning in R16, and defer the necessity discussion of applying new MG for legacy RRM to R17 * Concurrent PRS processing and RRM measurements: We propose to defer that to R17 as well, which means no requirement applies if there is concurrent PRS processing and RRM measurements in R16, and further discuss the RRM requirement impact for this scenario in R17 |
| Qualcomm | We don’t think “scheduling restrictions for PRS measurements in FR1” is a valid open issue anymore given that PRS measurements are only going to be defined within MG. For the same reason, UE behavior for the case of active BWP switching during PRS measurement is no longer a valid open issue. It is ok to remove “report mapping tables” issue for RSTD and UE Rx-Tx if companies feel like they are related to performance.  On downscoping:  we do not agree to down-scoping of new MG patterns in R16 and believe it is vital to even basic functionality of positioning. If PRS measurement requirements are only going to be defined with MG, and knowing that SSB and PRS cannot mapped to the same symbols, it is quite challenging to schedule PRS and SMTC with one gap pattern from the legacy R15 MG patterns. Other issues listed in RP-201117 are ok to be deferred to R17. |
| Intel | We have to face the fact that it is really challenging to complete all the open issues in one single e-meeting. Considering limited progress on critical issues such as measurement requirements for PRS RSTD, Rx-Tx, RSRP and so on, it is rational to consider some down-scoping, including new MG patterns, active BWP change during PRS measurement and concurrent PRS processing and RRM measurement. |
| MTK | Items to be removed from exception sheet.   * “Requirements for concurrent PRS processing and RRM measurements” If this means parallel processing of PRS and SSB on the same OFDM symbol, then it can be removed, too. We think it is still OK for Rel-16 if the baseline UE behavior is no concurrent processing. And it does not prohibit any UE to implement concurrent processing for better performance. * “UE behaviour for the case of active BWP switch during positioning measurements”. Same view as QC, this is no longer needed because all positioning measurement are gap assisted.   One new measurement gap, we think anyway RAN4 needs to conclude requirement based on Rel-15 gap patterns. Then RAN4 can move on to new gaps. In our understanding, it seems already very challenging to even finalize requirements only for Rel-15 gaps, because the impact to legacy RRM measurements should be properly addressed. We would like to hear view from companies on what are the additional effort for new gaps on top of existing gap patterns. With a common understanding on what to do, then we can evaluate if it is possible to conclude it in Aug.  Regarding the first 3 main items (PRS RSTD, UE Rx-Tx time, PRS RSRP), there are still many sub open issues to be discussed. RAN4 should start from the DL part which is common to all these 3 issues. |
| Huawei | For the issues under the bullet “other RRM impacts”  • Requirements for concurrent PRS processing and RRM measurements: this one could be down-scoped in Rel-16, which means no requirement is defined for the case when PRS and RRM measurement are to be performed concurrently  • UE behavior for the case of active BWP switch during positioning measurements: this one could be down-scoped in Rel-16, as it is a corner case and there is no difference from normal RRM measurement.  • New measurement gap patterns for positioning measurements and impacts on existing RRM measurements: we suggest to follow the principle agreed in RAN4#95 in Slide 3 of R4-2009266.  We are fine to remove the issue of report mapping in the exception sheet which is for core part, and further discuss it in the performance part. |
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## Intermediate summary (Tue June 30th)

**Moderator:** No comments were collected due to late thread triggering. Recommend to further collect comments by Wed. Please use the tables in Section 3.1 to provide the comments.