**3GPP TSG-RAN WG4 Meeting # 104-e R4-2214131**

**Electronic Meeting, 15 – 26 Aug 2022**

**Agenda item:** 9.9.3

**Source:** Moderator (MediaTek inc.)

**Title:** Email discussion summary for [104-e][211] NR\_MG\_enh\_1

**Document for:** Information

# Introduction

This document is the email discussion summary for [104-e][211] NR\_MG\_enh\_1 with the following topics covered

* Topic 1: General (AI 9.9.1)
* Topic 2: [Core requirement maintenance] Multiple concurrent and independent MG patterns (AI 9.9.1.2)
* Topic 3: [Performance requirements] Multiple concurrent and independent MG patterns (AI 9.9.2.2)

List of candidate target of email discussion for 1st round and 2nd round

* 1st round: Collect views from companies. Make early decision on issues with clear consensus. Decide on the scope, priority, options and tentative agreement to be discussed in the 2nd round.
* 2nd round:
  + Conclude the issues identified in the 1st round.
  + Revise and endorse draft CRs

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)

# Topic #1: General (AI 9.9.1)

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

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2212031 | OPPO | CR: CR to enhanced gap configuration for RRM requirements applicability |

## Open issues summary

Moderator: No open issue in this AI.

## Companies views’ collection for 1st round

### Open issues

Moderator: No open issue in this AI.

### CRs/TPs comments collection

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

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| **CR/TP number** | **Comments collection** |
| R4-2212031  OPPO | Moderator: This CR clarifies the limitation in current Rel-17 MG enh WI (e.g., no cross-feature requirements). Companies are encouraged to provide view on whether and how to introduce the limitation in spec. |
| Apple: we are fine to clarify this. Comments on wording can be provided once RAN4 agrees to add this clarification. |
| Ericsson: Fine to clarify no cross-feature requirements. We need to further check how to introduce the limitation since RAN4 will introduce the cross-feature in R18 soon. |
| MTK: The terminology of “gap” may depend on another discussion R4-2214054 in NCSG [213]. Some alignments are needed. Maybe this CR can be revised to capture the potential agreement. |
| Huawei:  We are fine with the intention, but the detailed wording may need further check. At least for the change in 9.1.7.2, we suggest the following update.   * either a single per-UE measurement gap is pre-configured by the network and no other “gap” is configured, one or two per-FR measurement gaps are pre-configured by the network and no other per-UE “gap” is configured or no other per-FR “gap” is configured in the same FR ~~as pre-configured gap~~, where the other “gap” including |
| CATT: fine to clarify and some wording refinements are needed. E.g.  The requirements related to concurrent measurement gap apply provided:   * UE indicates support of concurrent gap patterns, and * ~~Two per-UE measurement gaps or~~ the measurement gap combinations specified in Table 9.1.8-1 are configured by the network, and   Two per-UE gap is already included in the table 9.1.8-1. |
| OPPO: Agree to conclude to support this clarification in 1st round.  The changes from Huawei and CATT seem ok to us. The revision can be further discussed based on companies’ comments. |
| Qualcomm | Similar to comments from other companies, we can understand the intention but we don’t think all the changes in the CR are needed. Something more concise would be sufficient. Needs to be revised. |
| Nokia | Nokia: Similar to other companies we are wondering if this clarification is needed? Specification already state ‘either a single per-UE measurement gap is pre-configured by the network, or one or two per-FR measurement gaps are pre-configured by the network’. Our understanding is that this already state that only one Per-UE or up to two Per-FR pre-configured gaps can be configured  However, if RAN4 see that this needs to be further clarified (that pre-configured measurement gap cannot be configured and operate as concurrent measurement gap in Rel-17. Similar for a NCSG) RAN4 could state that for Rel-17 pre-configured gaps and NCSG does not apply as being valid gap patterns when concurrent gaps are used. This could be in section 3 or in section 9 (PRE-MG: 9.1.7.2, NCSG: 9.1.9.2).  For example, adding a clarification in section 9.1.8.1:  When UE supports concurrent measurement gap pattern capability, network can provide multiple measurement gaps configured by RRC message(s) as specified in TS 38.331 [2]. Requirements in this section applies when the UE is in SA operation mode.  In this release of the specification pre-configured measurement gap and a NCSG are not valid gap configurations with concurrent measurement gap.  Additionally, the part:  ‘Different gap priorities are associated to different gaps’  seems already captured in 9.1.8.3:  ‘The priority for a measurement gap is configured by networks via *gapPriority* in *GapConfig*. The requirements with concurrent measurement gaps apply provided that two measurement gaps colliding with each other are configured with different priorities.’ |

## Summary for 1st round

### Open issues

Moderator: No open issue in this AI.

### CRs/TPs

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

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

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| **CR/TP number** | **CRs/TPs Status update recommendation** |
| R4-2212031  OPPO | Revised.  Nokia questioned whether the clarification is needed and suggest to capture the limitation in a different section. More discusses are required in 2nd round  To capture comments from Huawei, CATT, Nokia.  Further wording refinement to be done in the 2nd round, e.g., the terminology of ‘gap’ |

## Discussion on 2nd round (if applicable)

# Topic #2: Core requirement maintenance (AI 9.9.1.2)

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

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2211895 | Apple | Proposal 1: proximity condition for overlapping in FR2-2 is 4ms.  Proposal 2: introduce the following concurrent gaps configuration restriction:  Option 1: When concurrent MGs are configured, the MGRP for each MG cannot be smaller than 40ms.  Option 2: When concurrent MGs are configured, up to one MGP can be configured with MGRP=20ms.  Proposal 3: introduce a new capability for concurrent gaps capable UE to indicate whether above concurrent gaps configuration restriction apply. |
| R4-2211942 | CMCC | *Proposal 1: it is not necessary to define an overhead cap for concurrent gaps. In order to exclude the combination of 20ms MGRP+ 20ms MGRP, clarification in the spec can be onsidered.*  Proposal 2: *In order to exclude the combination of 20ms MGRP+ 20ms MGRP, no need to extend the dropping rule, just add clarification that when concurrent MGs are configured, the MGRP for each MG cannot be smaller than 40ms.* |
| R4-2211955 | Xiaomi | Proposal 1: The minimum distance between two gap instances is 4ms for FR2-2.  Proposal 2: Option 3 is adopt to define the overhead capability, e.g. When concurrent MGs are configured, the MGRP for each MG cannot be smaller than 40ms. |
| R4-2212078 | MediaTek inc. | Proposal 1: When network configures concurrent gaps to UE, network can configure at most 1 MG with MGRP=20ms in an FR. |
| R4-2212079 | MediaTek inc. | CR: Maintenance CR on TS38.133 for concurrent gaps core part |
| R4-2212130 | Intel Corporation | *Proposal 1: Prefer to define the additional dropping rules in [2] to avoid the issue of concurrent MG overhead cap.* |
| R4-2212204 | Qualcomm Incorporated | Proposal 1: Reuse X = 4 for the proximity condition for colliding measurement gaps in FR2-2.  Proposal 2: Introduce an optional UE capability to signal the maximum overhead for concurrent MGs supported by the UE.   * The set of candidate values include {30%, 40%, 50%}. * The overhead cap applies per FR. * If the UE does not signal the capability, no overhead cap applies.   Proposal 3: Support the UE reporting its preferred maximum overhead for concurrent MG via UE Assistance Information. Request RAN2 to add new signalling for this purpose. |
| R4-2212760 | Ericsson | *Proposal 1: The dropping rule can be extended to handle the overhead cap.*  *Proposal 2: To move forward, RAN4 to extend the overlapping rule when two MGs configuring with MGRP=20ms.*   * *the lower priority gap can be cancelled regardless of proximity rule* * *Data scheduling is resumed on the dropped gap occasions* |
| R4-2212871 | Nokia, Nokia Shanghai Bell | 1. RAN4 need to resolve the remaining details related to legacy MG and concurrent MG. 2. Send LS to RAN2 asking RAN2 to introduce priority for legacy gaps. 3. Define the overhead cap: Option 3 (Introduce UE capability) 4. Definition of overhead cap: Option 3 (MGRP for each MG cannot be smaller than 40ms) |
| R4-2212872 | Nokia, Nokia Shanghai Bell | CR: CR for concurrent measurement gaps |
| R4-2212873 | Nokia, Nokia Shanghai Bell | LS: LS on priority for legacy gaps |
| R4-2213291 | ZTE Corporation | Not avialable |
| R4-2213508 | Huawei, HiSilicon | Proposal 1: Define X = 4ms for FR2-2.  Proposal 2: Update the requirement applicability as follows.   * RAN4 requirements do not apply when a gap without assigned priority is configured simultaneously with any other gap(s) that affect serving carriers in the same FR, if the gaps are colliding with each other.   Proposal 3: Introduce the following applicability condition on overhead cap for concurrent MG:   * When concurrent MGs are configured, the requirements apply provided that at most one gap in each FR (including per-UE gaps) is configured with MGRP < 40 ms |
| R4-2213509 | Huawei, HiSilicon | CR: CR on concurrent MG related requirements |
| R4-2213874 | ZTE Corporation | Proposal 1: The value of X for FR2-2 can be smaller or equals to 4 ms.  Proposal 2: RAN4 can wait for the signalling structure finally identified in RAN 2, and then further check the correlation between classic MG and concurrent MG.  Proposal 3: To move forward, we can compromise to Option 5, i.e. handling this issue by extending the dropping rule, instead of defining an overhead cap.  Proposal 4: Referring to the definition of additional dropping rule, we agree that when two MGs configuring with both MGRP = 20 ms, the lower priority can be canceled regardless of proximity rule. |

## Open issues summary

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

### Sub-topic 2-1: Overlapping

#### **Issue 2-1: Proximity condition for overlapping in FR2-2**

* Proposals
  + Option 1: Apple, Xiaomi, Qualcomm, Huawei
    - X = 4ms
* Recommended WF
  + Agree on Option 1 to close the issue

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| **Company** | **Comments** |
| Apple | Support option 1. |
| Xiaomi | Support option 1 |
| Intel | Recommended WF can be agreed. |
| ZTE | Agree with recommended WF |
| Ericsson | Fine with option 1 |
| MTK | Support Option 1 |
| Huawei | Support the Recommended WF. |
| vivo | OK with option 1 |
| CATT | Fine with option 1. |
| OPPO | Fine with option 1. |
| Qualcomm | Support the recommended WF |
| Nokia | We can agree to 4ms as proximity condition for overlapping gaps in FR2-2. |
| LGE | Support Option 1 |

#### **Issue 2-2: Relation between legacy (classic) MG and concurrent MG**

* Proposals
  + Option 1: Nokia
    - Send LS to RAN2 asking RAN2 to introduce priority for legacy gaps
  + Option 2: Huawei
    - Update the requirement applicability as follows
      * RAN4 requirements do not apply when a gap without assigned priority is configured simultaneously with any other gap(s) that affect serving carriers in the same FR, if the gaps are colliding with each other
* Recommended WF
  + Companies are encouraged to provide views in the 1st round. A draft LS can be arranged in the 2nd round if Option 1

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| **Company** | **Comments** |
| Apple | No strong view. Option 2 can resolve this in RAN4 without RAN2 impact. To proponent of option 1: can network configure legacy gap in GapConfig-r17? E.g. not setting ncsgInd, preConfigInd and so on, just add gapPriority-r17 |
| Xiaomi | Option 2, according to RAN2 signaling design, the measurement gap is configured with priority, and in my understanding, the legacy gap without priority and concurrent MGs cannot be configured simultaneously. |
| Intel | Option 1 is NOT preferable.  Introducing of the priority for legacy gaps seems not Rel17 WI scope, which has significant impacts on the legacy measurement gap configuration. |
| ZTE | Option 1 and Option 2 are both fine to us.  Option 2 comes from the perspective of RAN4. Considering signalling structure is involved in, so sending LS to RAN2 to achieve alignment between RAN2 and RAN4 is fine. |
| Ericsson | We have some different views.  To avoid further effort in RAN2 and scenario limitation in RAN4, we suggest defining a default priority for legacy MG. If legacy MG colliding with ConMG, the legacy MG should be dropped. |
| MTK | In our understanding, RAN2 will continue the discussion for the potential default priority of the legacy gap in this meeting. We suggest to wait in the 1st round and comeback in the 2nd round with potential RAN2 conclusions. |
| Huawei | We are fine with either option. |
| vivo | We support option 2. Option 2 is a further clarification based on existing agreement. At this stage it is better to avoid RAN2 impact unless there is a strong necessity. |
| CATT | Option 2.  Same view as Xiaomi that the R16 measurement gap and R17 concurrent gap cannot be configured simultaneously. |
| OPPO | We are ok with Ericsson’s proposal, since the similar solution of default priority for legacy MG has been proposed and discussed in last meeting. We can also accept option 2 to avoid any RAN2 impact. |
| Qualcomm | From RAN4 point of view, there is no benefit to configuring a ‘legacy’ measurement gap as opposed to configuring a gap using the new gapConfig-r17 IE. The new IE is a superset of the legacy one. From RAN2, point of view, the motivation could be to save signaling in some cases. However, to allow one legacy MG to be configured as part of a concurrent MG combination, RAN4 would need to introduce some default rules to determine the priority of the legacy MG and to decide which MOs would be associated with the legacy MG.  Note also that the RAN4 spec already says: “The requirements of concurrent measurement gaps in section 9 shall not apply when a gap without assigned priority is configured simultaneously with any other gap(s) that affect serving carriers in the same FR.”  We agree that option 1 is not preferred.  Option 2 is fine but it does not address the issue of how MOs are mapped to a legacy measurement gap. |
| Nokia | Initially, the options are not fully exclusive as we point out in our paper.  We do suggest asking/aligning RAN2 for clarification and clear rules regarding the priority (implicit or explicit) of a legacy/classical gap and account the reply from RAN2 in RAN4.  In the WF from last meeting RAN4 agreed: Issue 2-2-3: Classic MG and concurrent MG < Agreement>:   * No differentiation between classic and concurrent MG in the requirements. * RAN4 requirements do not apply when a gap without assigned priority is configured simultaneously with any other gap(s) hat affect serving carriers in the same FR.   + - RAN4 can revisit the agreement after RAN2 signalling design is concluded   Based on this, RAN4 will not differ between classic gaps and a concurrent gap in the requirements. Any gap will be recognized as a measurement gap – and only difference is whether the cap has an assigned priority.  Additionally, it is our understanding is that RAN2 did introduce an implicit priority where any configured concurrent GP has highest priority (over legacy/classic MG).  Anyway, RAN4 did not ask if RAN2 could introduce priority for classical gaps. And based on the RAN2 discussion and that RAN2 has an implicit understanding of the priority of classical gap, we see that it best to at least align the understanding between the two groups. RAN4 can either:  1) Apply the RAN2 implicit assumption on priority of classical gaps  2) Send LS to RAN2 to ask for clarification of the priority of a classical gap or alternatively ask RAN2 to introduce priority for classical gaps.  Our preference is to have clear rules. Whether it is implicit priority or configured priority for classical is not the most important. We do prefer having a priority for legacy/classical gaps as this would be more forward compatible when considering Rel-18 work. |
| LGE | We’re fine with both option 1 and option 2. For clear applicability, LS can be needed. |

### Sub-topic 2-2: Overhead cap

Moerator: Affter checking all contributions, it seems all comapnies are fine to introduce the cap. But the controversial part is on how to define it (UE capability, NW configuration limitation, extending dropping rules). Therefore, Moderator suggest to directly focus on the detail.

#### **Issue 2-3: How to define the overhead cap when concurrent MGs are configured**

* Proposals
  + Option 1: Introduce UE capability to indicate whether configuration restriction apply
    - Option 1a: Apple, Xiaomi, Nokia
      * The MGRP for each MG cannot be smaller than 40ms
    - Option 1b: Apple
      * Up to one MGP can be configured with MGRP=20ms
    - Option 1c: Qualcomm
      * A set of candidate values of per FR maximum overhead includes {30%, 40%, 50%}
  + Option 2: Directly add NW configuration limitation in spec
    - Option 2a: CMCC
      * The MGRP for each MG cannot be smaller than 40ms simultaneously
    - Option 2b: MTK, Huawei
      * Up to one MGP can be configured with MGRP=20ms
  + Option 3: Extending dropping rules
    - Option 3a: Intel, E///
      * when two MGs configuring with MGRP=20ms, the lower priority gap can be cancelled regardless of proximity rule and data scheduling is resumed on the dropped gap occasions
  + Option 4: Qualcomm
    - Signal the preferred maximum overhead via UE Assistance Information. Request RAN2 to add new signalling for this purpose.
* Recommended WF
  + Companies are encouraged to provide views in the 1st round.

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| **Company** | **Comments** |
| Apple | We are fine with all options on the table. Prefer option 1a/2a. Question to proponent of option 3a, since the lower priority gap will always be cancelled, is there any motivation for network to configure the gap with lower priority? If not, is it identical to option 2b? |
| Xiaomi | Option 1a, regarding option 1b, if one of the MGRP is configured as 20ms, and its gap priority is higher than the other one, considering the proximity of gap collision, the gap with larger MGRP (e.g.40ms) will not have the chance to be measured, as show in following figure: |
| Intel | We prefer Option 3 because in comparison with other options, it is most simple and straightforward way. For an example, Option 2 need more extra works beside RAN4.  We can also compromise to Option 2. But how RAN4 will specify such NW restriction in TS38.133 shall be considered. |
| ZTE | We share similar view as Intel, Option 3 is more simple and straightforward way than others. Option 3 can be seen as the extension of overlapping rule. But in fact the effect of Option 3 is same as Option 2b. |
| Ericsson | Option 3.  From our understanding, network can manage this cap and tradeoff between the throughput loss and measurement gaps’ configuration. Thus, we think it’s unnecessary to define an overhead. To mover forward, we made a compromise solution to extend the dropping rule. Based on this solution, the scenario of one gap with MGRP=20ms and another gap with MGRP>20ms can be valid. |
| MTK | We suggest RAN4 to go with the direction of Option 2, i.e., neither UE capability nor any additional dropping rule. This direction seems the simplest solution. We are fine with either Option 2a or 2b. |
| Huawei | Option 2b.  On option 2a, compared to option 2b, option 2a has more restriction on NW configuration.  On option 1a and 1b, they are similar to option 2a and 2b but with UE capability. In our view, the need for UE capability depends on whether applicability condition in option 2b is acceptable to both UE and NW vendors. If that’s the case then we do not need to introduce a UE capability.  On option 1c, we understand such a capability may cause additional complexity at NW side, e.g. NW needs to calculate the overhead for each combination of MGPs. It is noted that the calculation may be further complicated with MG collision handling and per-FR MG.  On option 3, we understand it has same technical effect as option 2b, but the issue is that UE complexity would be increased since UE needs to implement another dropping rule for the case of 20ms+20ms MGRP. |
| CMCC | Firstly, for option 2a, the motivation is to exclude the combination of 20ms MGRP+ 20ms MGRP, but the combiniation with only one 20ms MGRP is allowed. Currently, the wording in option 2a is not clear, what we want to say is that “The MGRP for each MG cannot be smaller than 40ms simultaneously”. From this point of view, option 2a and option 2b are same. Both are OK for us.  Option 1/4 involve RAN2 signaling impact, considering ASN.1 is frozen, we are not sure whether it is feasible.  Option 3, technically, this option is OK. But it may complex the existing dropping rules. |
| Vivo | OK with either option 1 or option 2. |
| CATT | Option 2b. We can simply define requirements applicability based on option 2b, i.e. the requirements are not applied for 20ms+20ms MGRP. |
| OPPO | Fine with option 4. Compared to Option 1/2, it could be easy for both network configuration and UE behavior. |
| Qualcomm | With option 1a, the max overhead is capped at 30% (MGP0 + MGP0) and with option 1b the max overhead is at least 40% (MGP4 + MGP7). In both cases, gap combinations with lower overhead would be precluded. To maximize the number of gap combinations that can be configured, it would be better to limit the overhead directly, instead of adding rules to exclude MGRP values.  For this reason, we support signaling an overhead cap either via UE capability (option 1c) or via UAI (option 4).  Adding a limitation on NW configuration could also be another option but, again, it should be based on an overhead cap instead of limitations on MGRP. |
| Nokia | Although we initially did not see a need for introducing this cap, we compromised in last meeting to account the UE complexity. However, when then introducing this overhead cap RAN4 need to consider the network complexity. In general, it is complex on network to account too many per-UE specific capabilities when it comes to measurement gap configurations (which is also why we have a set of mandatory GPs defined).  Hence, we prefer a rule which can account the UE concerns while not adding overly complex scenarios. Hence, we are fine with either options 1a or 1b (we listed 1a as it was one of the options listed in the agreed WF). If option 1b is now on the table, we have preference for 1b over 1a as it gives slightly more network flexibility.  If all companies agree to introduce overhead cap, there wouldn’t necessarily be a need for a capability to indicate this the network – as we also point out in our paper.  Hence, we can also support options 2a and 2b with a similar preference for 2b.  Just to clarify: out understanding of proposals 1b/2b is that the UE can be configured with 1 MG with MGRP = 20ms while the other MG has to have a longer MGRP (40ms or longer). |
| LGE | Support Option1. And option 1c is preferred. |

## Companies views’ collection for 1st round

### Open issues

Moderator: Company views are collected in previous section

### CRs/TPs comments collection

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

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| **CR/TP number** | **Comments collection** |
| R4-2212079  MTK | Apple: fine with the CR. |
| Xiaomi: fine with change |
| Ericsson: fine with the CR. |
| Huawei:  In clause 9.3.9.1, with the CR, the below paragraph is only applicable for UE not configured with con-MGs, but we understand it is also applicable for UE configured with con-MGs.  *For calculation of Kp , if the high layer signalling (TS 38.331 [2]) of smtc2 is configured, for cells indicated in the pci-List parameter in smtc2, the SMTC periodicity corresponds to the value of higher layer parameter smtc2; for the other cells, the SMTC periodicity corresponds to the value of higher layer parameter smtc1. Kp is only applicable for UE supporting concurrentMeasGap-r17.*  In addition, the last sentence in this paragraph should be removed.  Other changes are fine. |
| Qualcomm: OK. One minor correction below.  For a UE supporting *concurrentMeasGap-r17* ~~or~~and when concurrent gaps are configured |
| Nokia: Changes are agreeable |
| R4-2212872  Nokia | Apple: fine with the CR but it still depends on outcome of issue 2-3. |
| Xiaomi: depends on the conclusion on issue 2-3 |
| Ericsson: Depends on the discussion |
| MTK: One the 2nd change  “The requirements of concurrent measurement gaps in section 9 shall not apply when a gap without assigned priority is configured simultaneously with any other gap(s) that affect measurements on serving carriers in the same FR.”,  we have a slightly different view. We think not only the measurements but also other DL/UL data scheduling should also be covered by this sentence. The reason is that the priority also affects the decision on gap dropping. Data scheduling should be resumed for dropped gap occasions. |
| Huawei:  In clause 9.1.8.2, the introduction of the overhead cap depends on outcome of issue 2-3. Our preference is to adopt option 2b which has less restriction than option 2a which is assumed in the CR.  In clause 9.1.8.3, we are not sure if we need to add “measurements on” as suggested in the CR. For example, when a per-UE gap is configured for PRS measurement and a per-FR gap for FR1 is configured for RRM measurement, only the latter will affect the serving cell measurement in FR1, but still we need to resolve the collision between the two MGs with priority. |
| Qualcomm: Pending issue 2-3 |
| Nokia: thanks for the comments. We are fine to discuss the changes together with issue 2-3. Our preference is to have common understanding of the requirements and can discuss the wording. |
| R4-2213509  Huawei | Apple: fine with the CR but it still depends on outcome of issue 2-3. |
| Xiaomi: depends on the conclusion on issue 2-3 |
| Ericsson: Depends on the discussion |
| MTK: pending on the conclusions of issues 2-2 and 2-3. |
| Qualcomm: Pending issues 2-2 and 2-3. |
| Nokia: Changes are still pending discussion and agreement. |

## Summary for 1st round

### Open issues

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

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| **Status summary** |
| **Issue 2-1: Proximity condition for overlapping in FR2-2**  *Status*: All companies are fine with Option 1 (X=4ms)  *Tentative agreements*: For proximity condition for overlapping in FR2-2, X=4ms.  *Candidate options*: N.A  *Recommendations for 2nd round*: Capture the tentative agreement in the WF for further review in the 2nd round. |
| **Issue 2-2: Relation between legacy (classic) MG and concurrent MG**  *Status*: Companies’ views are diverse. Option 2 seems get more support (5 companies). However, some companies want to define a default priority. Some companies do not see the need to change previous RAN4 agreement. Some companies are fine to send an LS to RAN2 for clarification.  *Tentative agreements*: No  *Candidate options*:   * + Option 1: Send LS to RAN2 asking RAN2 to introduce priority for legacy gaps   + Option 2: No requirement applies when legacy and new gap collides.   + Option 3: Assign a default priority to legacy gap   + Option 4: No requirement when legacy gap (gapConfig) and new gap (gapConfig-r17) are both configured.   *Recommendations for 2nd round*: Continue discussion in the WF of 2nd round |
| **Issue 2-3: How to define the overhead cap when concurrent MGs are configured**  *Status*:   * Option 1a: Apple, Xiaomi, vivo, Nokia, LGE * Option 1b: vivo, Nokia, LGE * Option 1c: vivo, LGE (preferred) * Option 2a: Apple, Intel, MTK, CMCC, vivo, Nokia * Option 2b: Intel, MTK, Huawei, CMCC, vivo, CATT, Nokia * Option 3: Intel, ZTE, Ericsson * Option 4: OPPO, Qualcomm   *Tentative agreements*: N.A  *Candidate options*: Same as 1st round  *Recommendations for 2nd round*: This issue will be handled in GTW. Moderator will capture the GTW conclusions, if any, in the 2nd round WF for further discussion. |

### CRs/TPs

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

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| **CR/TP number** | **CRs/TPs Status update recommendation** |
| R4-2212079  MTK | *To be revised*  Address comments from Huawei and Qualcomm |
| R4-2212872  Nokia | *To be revised*  To avoid overlapping with 3509, suggest keeping only Section 9.1.8.2 in this paper  To capture the conclusions of Issue 2-3  Address comment from MTK and Huawei |
| R4-2213509  Huawei | *To be revised*  To avoid overlapping with 2872, suggest keeping only Section 9.1.8.3 in this paper  To capture the conclusions of Issue 2-3 |

## Discussion on 2nd round (if applicable)

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

# Topic #3: Performance requirement (AI 9.9.2.2)

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2211896 | Apple | CR: draftCR on concurrent gaps test case for FR2 SA with SSB and PRS |
| R4-2212083 | MediaTek inc. | CR:CR on TS38.133 for concurrent MG test case No 2 |
| R4-2212134 | Intel Corporation | CR: [draftCR] CR for concurrent MG test case No 4 |
| R4-2212761 | Ericsson | CR:Test case for Con-MGs TC1 |
| R4-2212875 | Nokia, Nokia Shanghai Bell | CR:DraftCR TC#3 on Concurrent Measurement Gaps |
| R4-2213298 | ZTE Corporation | Not available |
| R4-2213514 | Huawei, HiSilicon | Proposal 1: Define TC #3, 4 and 7 in [1] for verifying performance of PRS and LTE measurement with concurrent MGs.  Proposal 2: Pick 1 TC (e.g. TC#1) for SBI reporting.  Proposal 3: Use simultaneous per-UE gap and per-FR gap in TC #4 and 7**.** |
| R4-2213515 | Huawei, HiSilicon | CR:CR to introduce TC#5 for concurrent MGs |
| R4-2213881 | ZTE Corporation | CR:Draft CR on test case for Concurrent MG for FR2 PPO in TS38.133 A.7.6.2.x |

## Open issues summary

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

### Sub-topic 3-1 High-level principles

#### **Issue 3-1: Whether to introduce test cases for PRS measurement**

* Proposals
  + Option 1: Huawei
    - Yes
* Recommended WF
  + Collect views in 1st round

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Apple | Fine with option 1. |
| Intel | We also prefer to define TC for PRS measurement together with other measurements (e.g. PRS + SSB). |
| ZTE | Fine with Option 1. |
| Ericsson | Fine with option 1. |
| MTK | OK with Option 1 |
| Huawei | Option 1. |
| CMCC | OK with option 1 |
| CATT | Fine with option 1. |
| Nokia | Fine with option 1 |

#### **Issue 3-2: Whether to introduce test cases for EUTRAN measurement**

* Proposals
  + Option 1: Huawei
    - Yes
* Recommended WF
  + Collect views in 1st round

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Apple | Fine with option 1. |
| Intel | No strong opinion |
| ZTE | Fine with Option 1. |
| Ericsson | Fine with Option 1. |
| MTK | OK with Option 1 |
| Huawei | Option 1. |
| CMCC | OK with option 1 |
| vivo | Option 1 |
| CATT | Fine with option 1. |
| OPPO | Fine with option 1. |
| Nokia | Fine with option 1 |

#### **Issue 3-3: Which test case to add SBI reporting**

* Background: Agreement in last meeting
  + **< Agreement>** Define test case without SBI reporting. FFS whether and how to pick 1 test case for SBI reporting
* Proposals
  + Option 1: Huawei
    - TC#1
* Recommended WF
  + Collect views in 1st round

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Apple | We fail to understand the necessity of adding SBI reporting, which has nothing to do with the functionality to be verified. |
| Intel | No strong opinion. But seems SBI detection is common function which can be verified by the existing TC already. |
| ZTE | Similar view as Intel. |
| Ericsson | No strong view. Could Huawei further explain the reason to introduce the SBI reporting? |
| MTK | We can compromise with adding SBI reading in TC#1, although we do not see it necessary. |
| Huawei | Option 1.  To clarify, we are also fine to not have SBI reading in the test, and the reason behind option 1 is that in last meeting there were different views on this issue, and we see option 1 as a way for compromise. |
| vivo | Same view as apple. The necessity is not strong. |
| CATT | No strong view. |
| Nokia | We are fine with defining such TC if this is agreed, but no strong view. |

## Companies views’ collection for 1st round

### Open issues

Moderator: Company views are collected in previous section

### CRs/TPs comments collection

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

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2211896  Apple | Intel: It is up to issue 3-1.  And for types of PRS measurement, in TC4 from Intel, RSTD measurement is used, whether the same PRS measurements (RSRP, RSTD) shall be used for TC4 and TC7 can be discussed. |
| MTK: Similar comment regarding association as 2083. |
| Qualcomm:   1. Table A.7.6.X2.3.1-1: SA event triggered reporting tests for FR1-FR1 2. There are corrections CRs for PRS-RSRP tests cases in thread 201 (e.g. R4-2211717). Suggest to track/merge the relevant agreed changes to this CR. |
| R4-2212083  MTK | Intel: is the additional SMTC configuration necessary? |
| MTK:   * We found that the associations between the MGs and MOs are missing in the settings. We can revise the CR to add the association, e.g.,   Two measurement gap patterns (MeasGapId #0 and MeasGapId #1) are configured with the gap pattern ID #0 and #1 as defined in Table A.6.6.X2.2.1-2. MeasGapId #1 is configured with a higher priority than MeasGapId #0. MeasGapId #0 and MeasGapId #1 are associated with the MOs for RF channel numbers #1 and #2, respectively.   * We also need to correct the MG offset for id#1. Since the periodicity is 40ms, the offset should be 39ms, rather than 79ms * To Intel: the new SMTC is added to make the 2 SMTCs from different freq layers closed to each other enough in time. So that we can configure 2 MGs with PPO. |
| Qualcomm: Correct typo  The TE schedules ontinuous DL data on PCell throughout the test. |
| R4-2212134  Intel | Intel: It is up to issue 3-1. We will also update part of them to aligned with other TCs |
| MTK:   * There are MG settings in both Table A.6.6.x2.1.1-2 and Table A.6.6.x2.1.1-4. Offset for gap#24 is missing. We suggest to align with 1896. * In Table A.6.6.x2.1.1-4, what does it mean by “number of non-dropped associated gap occasions covering PRS occasions” ? * PRS configurations seems missing? * There is an empty row in A.6.6.x2.1.1-2 * This sentence seems redundant? “In this test measurement gap pattern configuration # 0 for SSB measurements as defined in Table A.6.6.x2.1.1-2 is provided for UE that does not support per-FR gap..” * Similar comment regarding association as 2083. |
| Qualcomm:   1. PRS configurations appear to be missing. 2. No mention of PRS assistance data or location request in the test procedure. 3. There are corrections CRs for PRS-RSRP tests cases in thread 201 (e.g. R4-2211717). Suggest to track/merge the relevant agreed changes to this CR. |
| R4-2212761  Ericsson | MTK:   * According to the meeting guidance, this should be a draft CR, not formal. * According to the agreed WF R4-2210585, this test case is for FNO. But the title is PPO * In our view, *Time offset between serving and neighbour cell 2* can be 3us in this case. Maybe we can further check. * Similar comment regarding association as 2083 * Offset of MG#1 should be 39ms |
| Qualcomm:   1. “79 for MeasGapId #0” Gap pattern 0 has MGRP = 40 ms. |
|  |
| R4-2212875  Nokia | MTK:   * In Table A.x.x.x.x.1-2, we do not need ‘unit’ for Gap Pattern Id #1 and #2. * Need an absolute MG offset at least for Gap Pattern Id #1 * Similar comment regarding association as 2083 |
| Qualcomm:   1. Test case #3 is supposed to be FR1 only according to the WF. ? 2. Format cell description with bullets or numbered for readability  |  | | --- | | **Description of target cell** | | LTE FDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |  1. Inconsistent numbering of the neighbor cells. “Cell 2 is an inter-RAT E-UTRAN inter-RAT neighbour cell” 2. ETU70? |
|  |
| R4-2213515  Huawei | MTK:   * In A.7.6.X2.1.2 Test Requirements, UE is only required to report 1 single measurement event. In our understanding, UE needs to report 2 events. * An editorial error for NOTE 3 in Table A.7.6.X2.1.1-3. |
| Qualcomm:   1. Add channel number for Cell 3 in Table A.7.6.X2.1.1-2 2. Fix channel number for Cell 3 in Table A.7.6.X2.1.1-3 |
|  |
| R4-2213881  ZTE | MTK: gap offset 41ms may not be able to cover SMTC.1 and SSB of Cell3. please check |
| Qualcomm:   1. The gap with longer MGRP (#14) should have the highest priority. |
|  |

## 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** |
| **Issue 3-1: Whether to introduce test cases for PRS measurement**  *Status*: All companies are fine with Option 1  *Tentative agreements*: Introduce test cases for PRS measurement, i.e., No 4 and 7 in agreed WF R4-2210585  *Candidate options*: N.A  *Recommendations for 2nd round*: This issue will be online confirmed in GTW. Moderator will capture the GTW conclusion, if any, and recommend the corresponding CR to be continue discussing in 2nd round. |
| **Issue 3-2: Whether to introduce test cases for EUTRAN measurement**  *Status*: All companies are fine with Option 1  *Tentative agreements*: Introduce test cases for EUTRAN measurement, i.e., No 3 in agreed WF R4-2210585  *Candidate options*: N.A  *Recommendations for 2nd round*: This issue will be online confirmed in GTW. Moderator will capture the GTW conclusion, if any, and recommend the corresponding CR to be continue discussing in 2nd round. |
| **Issue 3-3: Which test case to add SBI reporting**  *Status*: Most companies do not have strong view. Some companies do not see the necessity.  *Tentative agreements*: N.A  *Candidate options*: Same as 1st round  *Recommendations for 2nd round*: This issue will be online confirmed in GTW. Moderator will capture the GTW conclusion, if any, and recommend the corresponding CR to be continue discussing in 2nd round. |

### CRs/TPs

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

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| R4-2211896  Apple | *To be revised*  Please address comments from Intel, MTK and QC. |
| R4-2212083  MTK | *To be revised*  Please address comments from Intel, MTK and QC. |
| R4-2212134  Intel | *To be revised*  Please address comments from Intel, MTK and QC. |
| R4-2212761  Ericsson | *To be revised*  Please address comments from MTK and QC. |
| R4-2212875  Nokia | *To be revised*  Please address comments from MTK and QC. |
| R4-2213515  Huawei | *To be revised*  Please address comments from MTK and QC. |
| R4-2213881  ZTE | *To be revised*  Please address comments from MTK and QC. |

## Discussion on 2nd round (if applicable)

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

# Recommendations for Tdocs

## 1st round

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **New Tdoc number** | **Title** | **Source** | **Comments** |
| TBD | WF on WF on R17 NR MG enhancements – multiple concurrent MGs | MediaTek inc. |  |
|  |  |  |  |
|  |  |  |  |

**Existing tdocs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-2212031 | TBD | CR to enhanced gap configuration for RRM requirements applicability | OPPO | Revised |  |
| R4-2212873 |  | LS on priority for legacy gaps | Nokia | Revised | To: RAN\_2 |
| R4-2212079 |  | Maintenance CR on TS38.133 for concurrent gaps core part | MediaTek inc. | Revised |  |
| R4-2212872 |  | CR for concurrent measurement gaps | *Nokia* | Revised |  |
| R4-2213509 |  | CR on concurrent MG related requirements | *Huawei* | Revised |  |
| R4-2211896 |  | draftCR on concurrent gaps test case for FR2 SA with SSB and PRS | Apple | Revised |  |
| R4-2212083 |  | CR on TS38.133 for concurrent MG test case No 2 | MediaTek inc. | Revised |  |
| R4-2212134 |  | [draftCR] CR for concurrent MG test case No 4 | Intel | Revised |  |
| R4-2212761 |  | Test case for Con-MGs TC1 | Ericsson | Revised |  |
| R4-2212875 |  | DraftCR TC#3 on Concurrent Measurement Gaps | Nokia | Revised |  |
| R4-2213515 |  | CR to introduce TC#5 for concurrent MGs | Huawei | Revised |  |
| R4-2213881 |  | Draft CR on test case for Concurrent MG for FR2 PPO in TS38.133 A.7.6.2.x | ZTE | Revised |  |

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** | **Revised to** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-22xxxxx |  | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
| R4-22xxxxx |  | WF on … | YYY | Agreeable, Revised, Noted |  |
| R4-22xxxxx |  | 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