**3GPP TSG-RAN WG4 Meeting # 98-e-Bis R4-200XXXX**

**Electronic Meeting, Jan 25– Feb 5, 2021**

**Agenda item:** 11.5.1 and 11.5.2.2

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

**Title:** Email discussion summary for [98e][233] NR\_MG\_enh\_1

**Document for:** Information

# Introduction

This document is the email discussion summary for [98e][233] NR\_MG\_enh\_1 with the following topics covered

* Topic 1: General (AI 11.5.1)
* Topic 2: Multiple concurrent and independent MG patterns (AI 11.5.2.2)

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

* 1st round: Decide on the scope, priority, options and tentative agreement to be discussed in the 2nd round. Conclude issues with strict consensus, if any.
* 2nd round: Conclude the issues identified in the 1st round.

# Topic #1: General (AI 11.5.1)

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2101061 | MediaTek inc | **Proposal 1**: RAN4 to agree on the latest RRM work plan for “R17 NR and MR-DC measurement gap enhancements WI” as presented in this contribution. |
| R4-2102535 | Ericsson | **Proposal 2:** In the first phase of the WI, RAN4 focus on the functionality and principles needed to support parallel MG patterns, while considering existing MG patterns first. |

## Open issues summary

### Sub-topic 1-1: Work plan

**Issue 1-1: Workplan proposals**

* Proposals
	+ Option 1: R4-201061 (extend core part by 2 quarters according to RAN#90e decision in RP-202868)
* Recommended WF
	+ Agree on the updated workplan in R4-201061

**Issue 1-2: Focus in the 1st phase of WI**

* Proposals
	+ Option 1: (Ericsson)
		- In the first phase of the WI, RAN4 focus on the functionality and principles needed to support parallel MG patterns, while considering existing MG patterns first.
* Recommended WF
	+ Companies to comment if Option 1 is agreeable

## Companies views’ collection for 1st round

### Open issues

**Issue 1-1: Workplan proposals**

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| **Company** | **Comments** |
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**Issue 1-2: Focus in the 1st phase of WI**

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| **Company** | **Comments** |
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### CRs/TPs comments collection

Moderator: No CRs/TPs in this AI

## Summary for 1st round

### Open issues

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

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

*Recommendations on WF/LS assignment*

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

### CRs/TPs

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

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| **CR/TP number** | **CRs/TPs Status update recommendation**  |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

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| **CR/TP/LS/WF number** | **T-doc Status update recommendation**  |
| XXX | *Based on 2nd round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

# Topic #2: Multiple concurrent and independent MG patterns (AI 11.5.2.2)

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

## Companies’ contributions summary

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| **T-doc #** | **Company** | **Proposals / Observations** |
| [R4-2100113](file:///D%3A%5Cdocs%5CR4-2100113.zip) | ZTE Corporation | **Proposal 1**: RAN4 will specify corresponding requirement after agreeing on the definition of concurrent MGs.**Proposal 2**: Define concurrent MGs as follows: two MGs are considered concurrent if they overlap with each other partly or completely.**Proposal 3**: No RF tuning time shall be considered when defining concurrent MGs since the current specification already allows 0.5 ms for RF tuning at the beginning and the end of MGs. |
| [R4-2100222](file:///D%3A%5Cdocs%5CR4-2100222.zip) | Apple | Observation 1: sometimes MG overhead can be lowered by configuring two concurrent and independent MG patterns.Observation 2: too many concurrent MG patterns would result in high MG overhead, which is not desirable considering data throughput degradation and mobility performance loss for carriers which are measured outside MG.**Proposal 1**: MG overhead should be taken into account when discussing the maximum number of multiple concurrent and independent MG patterns.**Proposal 2**: when configuring multiple MG patterns, NW should make sure that the MG overhead shall not exceed the maximum MG overhead of the pattern supported by the UE according to R15/16 capabilities supportedGapPattern and supportedGapPattern-NRonly.Observation 3: to guarantee basic mobility performance, R17 network still has to make sure all carriers can be measured by R15/R16 UEs with one single measurement gap pattern.**Proposal 3**: no more than 2 multiple concurrent and independent MG patterns is expected in R17.**Proposal 4**: RAN4 needs to discuss the measurement requirement for scenario wherein there is MG occasion overlapping between multiple concurrent MG patterns. |
| [R4-2100455](file:///D%3A%5Cdocs%5CR4-2100455.zip) | CATT | **Proposal 1**: The multiple concurrent gap patterns can be applied for all the measurements that need gaps. It is network implementation which measurement can be performed in a certain gap pattern. **Proposal 2**: The multiple concurrent gap patterns can be applied for different SMTC configuration. **Proposal 3**: The following issues need to be considered for the mechanisms of multiple concurrent and independent gap patterns: * The maximum number of multiple gap patterns
* The proximity of different gap patterns

UE behaviors and RRM requirements when different gap patterns fully or partially overlapped**Proposal 4**: When gap pattern #0 to pattern #23 defined in table 9.1.2-1 in TS 38.133 are used, at most three concurrent gap patterns can be configured. When gap #24 or #25 is used, at most 2 concurrent gap patterns can be configured. **Proposal 5**: When used for covering different SMTC configuration, at most 2 concurrent gap patterns can be configured. **Proposal 6**: When different SMTC and different measurement are both used, at most 3 concurrent gap patterns can be configured.  |
| [R4-2100641](file:///D%3A%5Cdocs%5CR4-2100641.zip) | LG Electronics | **Proposal 1**: Consider multiple same MG pattern IDs with different MG offset and different MG pattern IDs with different MG offset for multiple MG patterns.**Proposal 2**: Consider single MG pattern ID with multiple MG offsets as multiple MG patterns.**Proposal 3**: For UE capable of per-UE MG, consider MG pattern ID #0~#11 for multiple MG patterns.**Proposal 4**: For UE capable of per-FR MG, consider MG pattern ID #0~#11 for FR1 NR measurements and MG pattern ID #12~#23 for FR2 NR measurements for multiple MG patterns.**Proposal 5**: In Proposal 3 and 4, consider the existing applicable MG pattern IDs in Table 2.2 and Table 2.3.**Proposal 6**: Consider MG pattern IDs having same MGL for multiple MG patterns, if SMTCs are configured with same SMTC window duration.**Proposal 7**: Consider Primary MG pattern ID(s) and Secondary MG pattern ID(s) for multiple MG patterns.**Proposal 8**: In Proposal 7, consider that Secondary MG pattern ID(s) can be activated or deactivated to reduce performance degradation due to multiple MG patterns.**Proposal 9**: Consider MG pattern ID with largest MGRP of 160ms as one of multiple MG pattern IDs to reduce performance degradation due to multiple MG patterns.**Proposal 10**: Keep the existing UE measurement capability of monitoring of multiple layers for multiple MG patterns. |
| [R4-2100713](file:///D%3A%5Cdocs%5CR4-2100713.zip) | Xiaomi | **Proposal 1**: It is proposed to configure 2 independent measurement gap pattern during one measurement period.**Proposal 2**: The CSSF with gap should be defined based on the carriers to be measured with the same measurement gap pattern.**Proposal 3**: The MG offset difference between independent MGs should be larger than the MG duration. |
| [R4-2100870](file:///D%3A%5Cdocs%5CR4-2100870.zip) | CMCC | Observation 1: since requirements and UE behavior will be impacted by the scenarios, it is necessary to have discussion on the scenarios to which the multiple concurrent MG patterns are applied. **Proposal 1**: following two scenarios are suggested to be considered for the multiple concurrent and independent MG patterns:* Scenario 1: multiple concurrent MG patterns are applied for the same measurement purpose, e.g. multiple concurrent MG patterns are used for RRM measurement, different MG are used for the measurement of different frequency layers.
* Scenario 2: multiple concurrent MG patterns are applied for different measurement purpose, e.g. two MG patterns are configured, one is used for the RRM measurement, and the other one is used for the PRS measurement

Observation 2：multiple concurrent and independent MG patterns will result in more throughput loss.**Proposal 2**: It is necessary to determine the maximum number of concurrent and independent MG patterns, and the impact on the throughput need to be considered. |
| [R4-2101063](file:///D%3A%5Cdocs%5CR4-2101063.zip) | MediaTek inc. | Observation 1: The usage of the new gap can be SSB-periodicity specific, Inter-RAT specific, CSI-RS specific, PRS specific, NR-U RSSI specific, Intra-frequency specific, NCSG specific, etc..Observation 2: When UE supports concurrent gaps, the legacy gap applicability can be extended.Observation 3: The application of NR-only mandatory gaps in Rel-16 can be extended when UE supports concurrent gaps.**Proposal 1**: The overall data dropping rate won’t exceed the legacy NR system when multiple concurrent gap is introduced in R17.**Proposal 2**: The maximum number of concurrent MGs won’t be larger than 2 per UE or per FR, according to UE’s capability.**Proposal 3**: When UE supports both per-UE gap and concurrent gap, both MGs shall be per-UE gap.**Proposal 4**: When UE supports both per-FR gap and concurrent gaps, RAN4 can start the discussion the scenario when 1 FR1 gap, 1 FR2 gap and 1 additional FR1 new gap.**Proposal 5**: RAN4 to define the framework of usage for new gap dedicated to specific purpose(s), such as different RS(s), different RATs or different gap types.**Proposal 6**: RAN4 to ensure both UE and NW have the same understanding on the usage of the new gap.**Proposal 7**: In EN-DC, when UE supports per-UE gap or FR1 gap, the concurrent gaps will be configured by MN; when UE supports FR2 gap, the concurrent gaps will be configured by SN.**Proposal 8**: In NR SA, NE-DC, NR-DC, the concurrent gaps will be configured by MN.**Proposal 9**: Do not introduce the concurrent gap in LTE SA mode.**Proposal 10**: When concurrent gaps are partially or fully overlapping in a gap duration, they are treated as fully overlapping for these two gaps in that gap duration.**Proposal 11**: RAN4 can prioritize fully non-overlapping scenario. FFS whether to specify requirements for other partially and fully overlapped scenarios. |
| [R4-2101081](file:///D%3A%5Cdocs%5CR4-2101081.zip) | NEC | **Proposal 1**: When designing multiple MG patterns in a measurement period, RAN4 to agree that maximum of only one MG is allowed for every 20ms.**Proposal 2**: RAN4 to agree the principle for deciding the number of MG patterns per measurement period is “total cumulative MGL across MG patterns in a measurement period shall be less than current maximum MGL of 20ms and there cannot be more than one MG for each 20ms period”. |
| [R4-2101270](file:///D%3A%5Cdocs%5CR4-2101270.zip) | Intel Corporation | Observation 1. Whether and how many concurrent gap patterns supported by UE shall be completely up to UE implementation.**Proposal 1**: The number of supported concurrent gap patterns can be defined as UE capability. Observation 2: How to define the limitation of the total concurrent gap patterns activated can be FFS, e.g.* The static number or
* The adaptive limitation based on the gap instances within the concurrent gap pattern

Observation 4: It is feasible to allow the overlapping among the multiple gaps for the concurrent independent gap pattern.Observation 5: The serving gNB can configure the concurrent gaps for SSB and CSI-RS measurements without overlapping.Observation 6: When non-overlapping concurrent measurement gap patterns, the measurement requirements for SSB/CSI-RS/PRS in Rel15/Rel16 without the gap sharing can be applicable for them independently.Observation 7: The gap sharing factor shall be applicable to the delay requirements when overlapping case. Observation 8: How to define the gap sharing factor when the multiple concurrent gap patterns configured can be FFS. **Proposal 2**: The measurement delay requirement in case of multiple gaps shall be revisited. As a starting point, the two basic scenarios can be studied.* Non-overlapping
* Overlapping

**Proposal 3**: The gap patterns defined in Rel16 [3] can be reused for the gap instances being included in the multiple concurrent gap pattern.**Proposal 4**: The concurrent multiple MG pattern capability is per-UE.Observation 9: The gap instances configured by a same concurrent MG pattern can only be used by the specific measurement type(s) occurred in a same frequency layers indicated by serving gNBObservation 10: UE processing capability shall be taken count into the proximity of two adjacent gap instances in a concurrent measurement gap configuration. |
| [R4-2101538](file:///D%3A%5Cdocs%5CR4-2101538.zip) | OPPO | Observation 1: Current MG patterns can be reused for all concurrent and independent MG patterns.Observation 2: At most 5 pre-configured MG patterns are commonly considered for UE.**Proposal 1**: The maximum number of concurrent and independent MG patterns active at any time subjects to UE capabilities of DL CA and maximum number of measurement engines.**Proposal 2**: Define 3 as the maximum number of concurrent and independent MG patterns active at any time. **Proposal 3**: Additional MG are usually assumed to be supplement for those of per UE or per FR gap. |
| [R4-2102269](file:///D%3A%5Cdocs%5CR4-2102269.zip) | Nokia, Nokia Shanghai Bell | 1. For a Per UE gap capable UE, multiple concurrent and independent MGPs applies per UE.
2. For a Per FR gap capable UE, multiple concurrent and independent MGPs applies per FR.
3. A per FR GP capable UE shall support multiple concurrent and independent MGPs on at least one FR.
4. RAN4 need to agree on what is understood as independent MGPs
5. RAN4 should not define new requirements (multiple concurrent and independent MGPs) for which RAN4 already has defined requirements.
6. MGPs are not independent MGPs if they are fully or partially fully overlapping in time.
7. Partially but not fully overlapping or fully non-overlapping MGPs would be considered as independent MGPs.
8. RAN4 need to define which aspect are limiting factors on the UE side in terms of the maximum number of concurrent independent MGPs a UE would be able to support.
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| [R4-2102297](file:///D%3A%5Cdocs%5CR4-2102297.zip) | Qualcomm Incorporated | **Proposal 1**: RAN4 should enable configuration of independent MG patterns dedicated to RRM and NR positioning, respectively, during a positioning session.**Proposal 2**: RAN4 to discuss whether to consider NTN NR deployments during the specification of requirements for multiple concurrent and independent MG patterns.**Proposal 3**: RAN4 to specify UE capability to support up to a maximum of [2] per-UE or [3] per-FR concurrent and independent MG patterns.**Proposal 4**: Concurrent MG patterns that would have overlapping instances in time should not be allowed (except in the case of per-FR gaps in different FRs).**Proposal 5**: RAN4 should discuss requirements for minimum guard period between measurement gap instances when multiple concurrent MG patterns are configured. **Proposal 6**: RAN4 to discuss whether to specify a cap on aggregate fractional interruption time as applicability condition for configuring multiple concurrent and independent MG patterns.**Proposal 7**: RAN4 to discuss how to configure a dedicated MG pattern(s) for NR positioning measurements for the duration of a positioning session.Observation 1: The definition of CSSF within gap would need to be updated to account for multiple concurrent and independent MG patterns. |
| [R4-2102535](file:///D%3A%5Cdocs%5CR4-2102535.zip) | Ericsson | **Proposal 1**: In Rel-17, RAN4 introduces new MG patterns with MGL>20 ms and/or MGRP>160 ms.**Proposal 2**: In the first phase of the WI, RAN4 focus on the functionality and principles needed to support parallel MG patterns, while considering existing MG patterns first. **Proposal 3**: At least two MG gap patterns can be configured and used in parallel.* The maximum number of parallel MG patterns depends also on the exact definition of parallel MG patterns.

**Proposal 4**: The parallel MG patterns can be any of:* all per-UE,
* all per-FR (for the same FR), or
* a combination of per-UE and per-FR MG patterns, with at least one per-UE and at least one per-FR (for the FR in question).

**Proposal 5**: FFS: simultaneous use of parallel MG patterns in different FRs (e.g., at least one per-FR MG pattern used in FR1 in parallel with another MG pattern (per-FR in FR1 or per-UE) and at least one per-FR MG pattern used in FR2 in parallel with another MG pattern (per-FR in FR2 or per-UE)).**Proposal 6**: Consider at least the following aspects while defining rules for parallel MG patterns:* measurement type
* RAT
* Periodicity of signals to be measured in MGs
* Relation between the parameters of the parallel patterns.
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| [R4-2102811](file:///D%3A%5Cdocs%5CR4-2102811.zip) | Huawei, HiSilicon | **Proposal 1**: Support multiple concurrent MGs for measurements of different frequency layers, with same or different RS (SSB/CSI-RS/PRS).**Proposal 2**: All concurrent MGs are of the same type (per UE MG or per FR MG). At most 2 concurrent MGs are supported * for a UE, if UE is configured with per UE MG
* for an FR, if UE is configured with per FR MG

**Proposal 3**: All MG related requirements defined for single MG, including UE behaviour during MG, MG patterns and their applicability, MG timing, effective MGRP, MG interruption and UE UL behaviour after MG, apply for each of the multiple concurrent MGs.**Proposal 4**: Each frequency layer that requires MG is measured in a single MG.**Proposal 5**: CSSF is calculated independently for each of the multiple concurrent MGs.**Proposal 6**: UE is assumed to measure only in MGL of one MG in occasions where two MGs are overlapped. RAN4 to define sharing rules for cases where multiple MGs are partially/fully overlapped. |

## Open issues summary

### Sub-topic 2-1 Definition

**Issue 2-1: Definition of concurrent gaps**

* Proposals
	+ Option 1: (ZTE)
		- Two MGs are considered concurrent if they overlap with each other partly or completely
	+ Option 2: (LGE)
		- Multiple same MG pattern IDs with different MG offset
		- Different MG pattern IDs with different MG offset
		- Single MG pattern ID with multiple MG offsets
	+ Option 3: (Intel, Huawei)
		- The gap patterns defined in Rel16 can be reused for the gap instances being included in the multiple concurrent gap pattern.
* Recommended WF
	+ The gap patterns and offset defined in Rel-16 can be reused for the gap instances being included in the multiple concurrent gap pattern. FFS the limitation on overlapping.

### Sub-topic 2-2 Applicability

**Issue 2-2: Applicability (measurement purposes) of concurrent gaps**

* Proposals
	+ Option 1: Different SMTC configurations, e.g., different MOs (CATT, CMCC, Ericsson, HW)
	+ Option 2: Different RSs, e.g., SSB, CSI-RS, PRS, RSSI (CATT, CMCC, MTK, QC, Ericsson, HW, Intel)
	+ Option 3: Different RATs (CATT, CMCC, MTK, Ericsson, HW)
	+ Option 4: Different gap types, e.g., NCSG or pre-configured MG (MTK, LGE)
	+ Option 5: NTN measurement
* Recommended WF
	+ Can we agree on at least Options 1, 2 and 3 and FFS Options 4 and 5 in next meetings?

**Issue 2-3: Principle of concurrent gap usage**

* Proposals
	+ Option 1: (MTK)
		- RAN4 to ensure both UE and NW have the same understanding on the usage of the new gap.
	+ Option 2 (Huawei)
		- Each frequency layer that requires MG is measured in a single MG
* Recommended WF
	+ Companies to check if Option 1 is agreeable.

**Issue 2-4: Whether to introduce a new gap for dedicated purpose(s)**

* Proposals
	+ Option 1: (LGE)
		- Consider Primary MG pattern ID(s) and Secondary MG pattern ID(s), where that Secondary MG pattern ID(s) can be activated or deactivated to reduce performance degradation due to multiple MG patterns
	+ Option 2: (MTK)
		- RAN4 to define the framework of usage for new gap dedicated to specific purpose(s)
* Recommended WF:
	+ Need more discussions

### Sub-topic 2-3 UE capability related issues

**Issue 2-5: Max number of concurrent gaps**

* Proposals
	+ Option 1: (Apple, CATT, Xiaomi)
		- 2
	+ Option 2: (Ericsson)
		- At least 2
	+ Option 3: (HW)
		- 2 per UE or 2 per FR, according to UE’s per-FR gap capability
	+ Option 4: (QC, MTK)
		- 2 per UE gaps and 3 per FR gaps
	+ Option 5: (OPPO)
		- 3
	+ Option 6: (Intel)
		- Up to UE’s capability
	+ Option 7: (CATT)
		- When gap pattern #0 to pattern #23 defined in table 9.1.2-1 in TS 38.133 are used, at most three concurrent gap patterns can be configured. When gap #24 or #25 is used, at most 2 concurrent gap patterns can be configured.
		- When used for covering different SMTC configuration, at most 2 concurrent gap patterns can be configured.
		- When different SMTC and different measurement are both used, at most 3 concurrent gap patterns can be configured.
* Recommended WF
	+ Companies may need to revise the proposals after considering the capability of per-UE gap and per-FR gap.
	+ Moderator thinks it will be easier and clearer if we discuss the number for per-UE gap and per-FR gap separately. Therefore, please provide proposals again the max number of concurrent gaps for UE supporting only per-UE gap and supporting per-FR gap.

**Issue 2-6: Relation to per-UE gap and per-FR gap**

* Proposals
	+ Option 1: (HW, MTK, Nokia, LGE)
		- All concurrent MGs are of the same type (per UE MG or per FR MG)
	+ Option 2: (Ericsson) The parallel MG patterns can be any of
		- all per-UE,
		- all per-FR (for the same FR), or
		- a combination of per-UE and per-FR MG patterns, with at least one per-UE and at least one per-FR
	+ Option 2a(Intel) The gap patterns/instance configured by a same concurrent MG can be agnostic with per-UE or per-FR. ]
* Recommended WF
	+ Need more discussions

**Issue 2-7: Other aspects on UE capability**

* Proposals
	+ Option 1: (Intel)
		- The concurrent multiple MG pattern capability is per-UE
	+ Option 2: (Nokia)
		- A per FR GP capable UE shall support multiple concurrent and independent MGPs on at least one FR
* Recommended WF
	+ Moderator would like to request Intel to further clarify Option 1. It is not completely clear whether the capability is about the supporting of concurrent gap or the supporting of gap patterns (e.g., *supportedGapPattern*) for concurrent gap.

[Intel: Our proposal is more related to the issue 2-6. Each gap pattern/instance configured by a same concurrent MG can be either per-UE or per-FR. But if RAN4 needs to define the applicability of the whole single concurrent MG, it shall be UE specific.]

* + Need more discussions

### Sub-topic 2-4 Overlaping issues

**Issue 2-8: Whether to allow overlapping between concurrent gaps**

* Proposals
	+ Option 1: (QC, Xiaomi)
		- Concurrent MG patterns that would have overlapping instances in time should not be allowed
		- RAN4 should discuss requirements for minimum guard period between measurement gap instances when multiple concurrent MG patterns are configured
	+ Option 2: (MTK, Intel)
		- RAN4 can prioritize fully non-overlapping scenario. FFS whether to specify requirements for other partially and fully overlapped scenarios
	+ Option 3: (Apple, CATT, Intel, Nokia, Ericsson, Huawei)
		- RAN4 to define sharing rules for cases where multiple MGs are partially/fully overlapped
* Recommended WF
	+ Need more discussions

**Issue 2-9: Overlapping in gap duration, if overlapping is allowed**

* Proposals
	+ Option 1: (MTK)
		- When concurrent gaps are partially or fully overlapping in a gap duration, they are treated as fully overlapping for these two gaps in that gap duration
* Recommended WF
	+ Need more discussions

**Issue 2-10: UE behavior in overlapped gap occasion, if overlapping is allowed**

* Proposals
	+ Option 1: (E///)
		- UE is assumed to measure only in MGL of one MG in occasions where two MGs are overlapped
* Recommended WF
	+ Need more discussions

### Sub-topic 2-5 Overhead

**Issue 2-11: Overall MG overhead**

* Proposals
	+ Option 1a: (Apple, MTK)
		- NW should make sure that the MG overhead shall not exceed the maximum MG overhead of the pattern supported by the UE according to R15/16 capabilities
	+ Option 1b: (NEC)
		- Total cumulative MGL across MG patterns in a measurement period shall be less than current maximum MGL of 20ms and there cannot be more than one MG for each 20ms period
	+ Option 2: (LGE)
		- Consider MG pattern ID with largest MGRP of 160ms as one of multiple MG pattern IDs to reduce performance degradation due to multiple MG patterns
	+ Option 3: (QC)
		- RAN4 to discuss whether to specify a cap on aggregate fractional interruption time as applicability condition for configuring multiple concurrent and independent MG patterns
* Recommended WF
	+ Need more discussions

### Sub-topic 2-6 Measurement requirements

**Issue 2-12: CSSF**

* Proposals
	+ Option 1: (Xiaomi)
		- The CSSF with gap should be defined based on the carriers to be measured with the same measurement gap pattern.
	+ Option 2: (Huawei)
		- CSSF is calculated independently for each of the multiple concurrent MGs.
* Recommended WF
	+ The framework on how each gap is associated to different MOs, RSs, RATs, are not concluded yet. Moderator thinks maybe it is too early to directly agree on CSSF details. Moderator’s suggestion is to postpone this issue to next meeting.
	+ Please provide your view to above 2 options as well as to Moderator’s suggestion

**Issue 2-13: Measurement capability**

* Proposals
	+ Option 1: (LGE)
		- Keep the existing UE measurement capability of monitoring of multiple layers for multiple MG patterns.
* Recommended WF
	+ From Moderator’s point of view, it is not very clear whether the measurement capability is about # of layers, # of cells and # of beams, or the # of layers UE can measure in one gap occasion. Please LGE clarify a little bit.
	+ Need more discussion.

**Issue 2-14: Measurement delay requirements**

* Proposals
	+ Option 1: (Intel)
		- Two basic scenarios can be studied.
			* Non-overlapping
			* Overlapping
* Recommended WF

**Issue 2-15: Other aspects in measurement requirements**

* Proposals
	+ Option 1: (Huawei)
		- All MG related requirements defined for single MG, including UE behaviour during MG, MG patterns and their applicability, MG timing, effective MGRP, MG interruption and UE UL behaviour after MG, apply for each of the multiple concurrent MGs.
* Recommended WF
	+ Some of the items mentioned in Option 1 were already discussed in previous issues, e.g., UE behaviour during MG, MG patterns and applicability. Moderator suggest to focus on following items and see if some early agreement can be reached.
		- MG timing
		- Effective MGRP
		- MG interruption
		- UE UL behaviour after MG

### Sub-topic 2-7 Others

**Issue 2-15: RF re-tuning time**

* Proposals
	+ Option 1: (ZTE)
		- No RF tuning time shall be considered when defining concurrent MGs since the current specification already allows 0.5 ms for RF tuning at the beginning and the end of MGs
* Recommended WF
	+ Need more discussions

**Issue 2-16: New MG patterns**

* Proposals
	+ Option 1: (E///)
		- RAN4 introduces new MG patterns with MGL>20 ms and/or MGRP>160 ms
* Recommended WF
	+ Moderator thinks this proposal is not within the scope of this WI. Comments are welcomed

**Issue 2-17: Network configuration under DC**

* Proposals
	+ Option 1: (MTK)
		- In EN-DC, when UE supports per-UE gap or FR1 gap, the concurrent gaps will be configured by MN; when UE supports FR2 gap, the concurrent gaps will be configured by SN.
		- In NR SA, NE-DC, NR-DC, the concurrent gaps will be configured by MN
* Recommended WF
	+ Need more discussions.

**Issue 2-18: Support of concurrent gap in LTE SA**

* Proposals
	+ Option 1: (MTK)
		- Do not introduce the concurrent gap in LTE SA mode
* Recommended WF
	+ Need more discussions.

## Companies views’ collection for 1st round

### Open issues

**Issue 2-1: Definition of concurrent gaps**

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| **Company** | **Comments** |
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**Issue 2-2: Applicability (measurement purposes) of concurrent gaps**

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| **Company** | **Comments** |
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**Issue 2-3: Principle of concurrent gap usage**

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| **Company** | **Comments** |
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**Issue 2-4: Whether to introduce a new gap for dedicated purpose(s)**

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| **Company** | **Comments** |
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**Issue 2-5: Max number of concurrent gaps**

# of concurrent gap for per-UE gap:

# of concurrent gap for per-FR gap in FR1:

# of concurrent gap for per-FR gap in FR2:

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| **Company** | **Comments** |
|  | # of concurrent gap for per-UE gap: # of concurrent gap for per-FR gap in FR1:# of concurrent gap for per-FR gap in FR2: |
|  | # of concurrent gap for per-UE gap:# of concurrent gap for per-FR gap in FR1:# of concurrent gap for per-FR gap in FR2: |
|  | # of concurrent gap for per-UE gap:# of concurrent gap for per-FR gap in FR1:# of concurrent gap for per-FR gap in FR2: |
|  | # of concurrent gap for per-UE gap:# of concurrent gap for per-FR gap in FR1:# of concurrent gap for per-FR gap in FR2: |
|  | # of concurrent gap for per-UE gap:# of concurrent gap for per-FR gap in FR1:# of concurrent gap for per-FR gap in FR2: |
|  | # of concurrent gap for per-UE gap:# of concurrent gap for per-FR gap in FR1:# of concurrent gap for per-FR gap in FR2: |
|  | # of concurrent gap for per-UE gap:# of concurrent gap for per-FR gap in FR1:# of concurrent gap for per-FR gap in FR2: |

**Issue 2-6: Relation to per-UE gap and per-FR gap**

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| **Company** | **Comments** |
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**Issue 2-7: Other aspects on UE capability**

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| **Company** | **Comments** |
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**Issue 2-8: Whether to allow overlapping between concurrent gaps**

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| **Company** | **Comments** |
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**Issue 2-9: Overlapping in gap duration, if overlapping is allowed**

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| **Company** | **Comments** |
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**Issue 2-10: UE behavior in overlapped gap occasion, if overlapping is allowed**

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| **Company** | **Comments** |
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**Issue 2-11: Overall MG overhead**

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| **Company** | **Comments** |
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**Issue 2-12: CSSF**

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| **Company** | **Comments** |
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**Issue 2-13: Measurement capability**

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| **Company** | **Comments** |
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**Issue 2-14: Other aspects in measurement requirements**

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| **Company** | **Comments** |
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**Issue 2-15: RF re-tuning time**

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| **Company** | **Comments** |
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**Issue 2-16: New MG patterns**

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| **Company** | **Comments** |
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**Issue 2-17: Network configuration under DC**

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| **Company** | **Comments** |
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**Issue 2-18: Support of Concurrent gap in LTE SA**

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| **Company** | **Comments** |
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### 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** |
| XXX | Company A |
| Company B |
|  |
| YYY | Company A |
| Company B |
|  |

## Summary for 1st round

### Open issues

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

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

*Suggestion on WF/LS assignment*

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

### CRs/TPs

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

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| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation**  |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation**  |
| XXX | *Based on 2nd round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |