**3GPP TSG-RAN WG4 Meeting # 109 R4-2318181**

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**Agenda item:** 8.25.4

**Source:** Moderator (vivo)

**Title:** Topic summary for [109][225] NR\_DualTxRx\_MUSIM

**Document for:** Information

# Introduction

*Briefly introduce background, the scope of this email discussion (e.g. list of treated agenda items) and provide some guidelines for email discussion if necessary.*

This document provides the summary of topic [108bis] [221] NR\_DualTxRx\_MUSIM for the agenda 5.25.

# Topic #1: General aspects

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2318610**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2318610.zip) | Apple | **Proposal 1: No need to discuss further whether to introduce mandatory MUSIM gap patterns.** |
| [**R4-2319103**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319103.zip) | CMCC | ***Proposal 1: it is proposed to define the mandatory MUSIM gap patterns.*** |
| [**R4-2319136**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319136.zip) | Ericsson | ***Proposal 1: The UE which supports MUSIM feature shall support MUSIM gap patterns with MGL = 6ms, MGRP = 640ms or 1280ms.*** |
| [**R4-2319140**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319140.zip) | Ericsson | CR |
| [**R4-2319239**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319239.zip) | vivo | **Proposal 1: It is suggested that no further discussion on whether mandatory MUSIM gaps will be defined or not. When UE requests more than one periodic MUSIM gaps, at least one MUSIM gap has a MGRP larger than x ms where x could be 1280.****Proposal 2: At least one gap pattern among MUSIM gap pattern 16, 17, 20, 21, 24, 25, 26 shall be supported.** |
| [**R4-2319489**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319489.zip) | OPPO | **Proposal 1: Not introduce mandatory MUSIM gap pattern.** |
| [**R4-2319984**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319984.zip) | Huawei, HiSilicon | **Proposal 1: No need to discuss further whether to introduce mandatory MUSIM gap patterns.****Proposal 2: Do not include MUSIM gaps in term “GAP”.** |
| [**R4-2320293**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2320293.zip) | Nokia, Nokia Shanghai Bell | 1. Introduce 1 or 2 mandatory MUSIM gaps.
2. As minimum the UE shall support MUSIM gap 6ms MGL and 160ms MGRP.
 |
| [**R4-2320757**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2320757.zip) | Charter Communications, Inc | **Proposal 1: RAN4 shall define a set of mandatory MUSIM gap patterns.** |
| [**R4-2321007**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2321007.zip) | MediaTek inc. | **Proposal 1: No need to discuss further whether to introduce mandatory MUSIM gap patterns.****Proposal 2: Introduce the following feature group for R18 MUSIM WI:**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Features** | **Index** | **Feature group** | **Components** | **Prerequisite feature groups** | **Need for the gNB to know if the feature is supported** | **Applicable to the capability signalling exchange between Ues (V2X WI only)”.** | **Consequence if the feature is not supported by the UE** | **Type** | **Need of FDD/TDD differentiation** | **Need of FR1/FR2 differentiation** | **Capability interpretation for mixture of FDD/TDD and/or FR1/FR2** | **Mandatory/Optional** |
| 43.NR\_DualTxRx\_MUSIM | 43-1 | Requirements for MUSIM gaps | Support of requirements of MUSIM gap, including priority indication to network, collision handling between MUSIM gap and measurement gap and among MUSIM gaps | TBD | Yes | No | UE cannot meet the requirement for MUSIM gap | Per UE | No | No | N/A | Optional with UE capability |
|  | 43-2 | Keep solution | Support the indication of keeping all MUSIM gaps upon colliding among MUSIM gaps | 43-1 | Yes | No | UE follows priority rule upon colliding among MUSIM gaps | Per UE | No | No | N/A | Optional with UE capability |

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## Open issues summary

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

### Sub-topic 1-1 General aspects

**Issue 1-1-1: Mandatory MUSIM gap patterns**

* Proposals
	+ P1: No need to discuss further whether to introduce mandatory MUSIM gap patterns (Apple oppo Huawei MTK)
	+ P2: RAN4 to define the mandatory MUSIM gap patterns (CMCC Ericsson Nokia Charter Communications)
		- P2-1: The UE which supports MUSIM feature shall support MUSIM gap patterns with MGL = 6ms, MGRP = 640ms or 1280ms. (Ericsson)
		- P2-2: As minimum the UE shall support MUSIM gap 6ms MGL and 160ms MGRP (Nokia)
	+ P3: Compromise one, for UE support MUSIM feature, at least one gap pattern among MUSIM gap pattern 16, 17, 20, 21, 24, 25, 26 shall be supported (vivo)

|  |  |  |
| --- | --- | --- |
| **MUSIM Gap Pattern Id** | **MUSIM Gap Length (MGL, ms)** | MUSIM Gap Repetition Period (MGRP, ms) |
| 16 | 6 | 1280 |
| 17 | 6 | 2560 |
| 20 | 10 | 1280 |
| 21 | 10 | 2560 |
| 24 | 20 | 1280 |
| 25 | 20 | 2560 |
| 26 | 20 | 5120 |

*Recommendations: Check whether the compromise proposal P3 is agreeable.*

**Issue 1-1-2: Constraints on MUSIM gap request from UE side**

* Proposals
	+ P1: There need to be a reasonable balance between the UE NW-B requirements and the MUSIM gap pattern(s). There shall be a minimum MGRP defined for the requested MUSIM gap pattern; The UE shall at least support MUSIM MGRP of 160ms; (Nokia)
		- P1-1: UE is not required performing NW-B inter-frequency measurements (Nokia)
	+ P2: When UE requests the MUSIM gaps, the MGRP of highest priority gap should be larger than 160ms; When UE requests only one MUSIM gap, the MGRP should be larger than 80ms; The UE shall request MUSIM gaps with MGRP larger than 160ms when NW-B configures DRX cycle larger than 640ms. (Ericsson ZTE)
	+ P3: Do not define constraints on MUSIM gap request from UE side (MTK Xiaomi Qualcomm Huawei oppo Apple vivo Huawei Qualcomm MTK)
	+ P4: No discussion on introduction of mandatory MUSIM gaps. When UE requests more than one periodic MUSIM gaps, at least one MUSIM gap has a MGRP larger than x ms where x could be 1280. (vivo)

*Recommendations: Suggest to compromise to P3 based on majority view.*

**Issue 1-1-3: Use of term “GAP” for MUSIM gaps**

* Proposals
	+ P1: Do not include MUSIM gaps in term “GAP”. (Huawei)

*Recommendations: Agree P1*

**Issue 1-1-4: UE capability**

* Proposals
	+ P1: (MTK xiaomi)
		- Separate UE capability can be considered for the “keep solution” as per UE basis besides the “priority-based solution”.



* + P2: (vivo)

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Features** | **Index** | **Feature group** | **Components** | **Prerequisite feature groups** | **Need for the gNB to know if the feature is supported** | **Applicable to the capability signalling exchange between UEs (V2X WI only)”.** | **Consequence if the feature is not supported by the UE** | **Type****(the ‘type’ definition from UE features should be based on the granularity of 1) Per UE or 2) Per Band or 3) Per BC or 4) Per FS or 5) Per FSPC)** | **Need of FDD/TDD differentiation** | **Need of FR1/FR2 differentiation** | **Capability interpretation for mixture of FDD/TDD and/or FR1/FR2** | **Note** | **Mandatory/Optional** |
| 43.NR\_DualTxRx\_MUSIM | 43-1 | 1. MUSIM gap and “keep solution”  | 1. Support UE indicates preferred MUSIM gap priority and MUSIM gap priority configuration; support UE indicates “keep solution” and “keep solution” configuration |  musim-GapPreference-r17 | YES |  | UE is not capable to support MUSIM feature | Per UE | No | No | N/A |  | Optional |

*Recommendations: Suggest to agree P2*

# Topic #2: Collisions between gaps and priority rules

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2318611**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2318611.zip) | Apple | **Proposal 1: Do not define constraints on MUSIM gap request from UE side.****Proposal 2: when ‘keep solution’ is rejected, fall back to priority-based collision handling.****Observation 1: collision between MUSIM gap and Type-1 MG or gap configured without priority shall only happens when NW hasn’t been upgraded to support priority configuration of MUSIM gaps and NW A gaps.****Proposal 3: considering the scenario would only exist temporarily, we have no problem with not defining any requirements.** |
| [**R4-2318867**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2318867.zip) | Xiaomi | **Proposal 1: Do not define constraints on MUSIM gap request from UE side.****Proposal 2: Priority based solution is used (fallback to priority based solution) when “keep solution” is not granted.** **Proposal 3: Separate UE capability can be considered for the “keep solution” as per UE basis besides the “priority-based solution”.****Proposal 4: For issue 2-3-2 the collision between MUSIM gaps and type-1 MG, P1 is preferred.** |
| [**R4-2319033**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319033.zip) | China Telecom | **Proposal 1:** **We support that when NW A rejects the ‘keep solution’ indication, priority based solution is used.****Proposal 2: Agree that UE can be scheduled during the small gap between two collided MUSIM gaps (not overlapped). While defining the minimum value of the gap, UE processing capability should be considered.****Proposal 3: If the aperiodic gap collides with both periodic MUSIM gaps and Type-2 MG, the agreement in RAN4#108bis also applies by treating the aperiodic MUSIM gap as the highest priority.** |
| [**R4-2319101**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319101.zip) | CMCC | ***Proposal 1: when “keep solution” is indicated by UE and NW A rejects the “keep solution” indication, priority solution is in use.***  |
| [**R4-2319137**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319137.zip) | Ericsson | ***Proposal 1: When UE requests multiple MUSIM gaps, the MGRP of highest priority gap should be larger than 160ms. When UE requests only one MUSIM gap, the MGRP should be larger than 80ms.******Proposal 2: The UE shall request MUSIM gaps with MGRP larger than 160ms when NW-B configures DRX cycle larger than 640ms.******Proposal 3: When NW rejects ‘keep’ rule suggestion from UE side, UE shall follow ‘priority’ rule to handle the MUSIM gaps collision.******Proposal 4: When UE requests new MUSIM gap and NW configures the MUSIM gaps, the MUSIM gaps requested before shall be overwritten. The issue shall be discussed in RAN2.******Proposal 5: RAN4 to prioritize the gap with longer MGRP when any of the collision gaps is Type-1 MG. No requirement apply if any MUSIM gap collides with Type-1 MG and two gaps have same MGRP.*** |
| [**R4-2319240**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319240.zip) | vivo | **Proposal 1: For the issue on UE behavior when “keep solution” is indicated by UE and NW A rejects the ‘keep solution’ indication, either P1 or P2 is ok.** **Proposal 2: For issue 2-2-4, it is RAN2 issue.** **Proposal 3: When [x]< distance <= 4ms, the UE can be scheduled, where the distance is the non-physical overlapping part between two consecutive MUSIM gaps and 0<distance <= 4ms. Or the UE cannot be scheduled within this distance.** **Proposal 4: For aperiodic MUSIM gaps, agreement in [6] for issue 2-3-1-1 and 2-3-1-2 is sufficient to cover collision cases where an aperiodic MUSIM involves.** **Proposal 5: Collision between MUSIM gaps and measurement gaps without assigned priority is handled based on MGRP of these collided gaps.** **The gap pattern with longer MGRP implicitly has higher priority. In case of collision between multiple MUSIM and measurement gap occasions, collisions between gaps are resolved sequentially in order of decreasing MGRP, starting with the gap that has the longest MGRP. When “keep solution” is granted, UE keeps all remaining non-dropped colliding periodic and aperiodic MUSIM gaps.****Proposal 6: For collision between MUSIM gaps and any measurement gap without assigned priority involved, no requirements shall not apply when any two gap patterns in this collision have the same MGRP.****Proposal 7: If priorities are not assigned for Rel-18 MUSIM gaps, no requirements apply.**  |
| [**R4-2319490**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319490.zip) | OPPO | **Proposal 1: Do not define constraints on MUSIM request from UE side.** **Proposal 2: When keep solution is requested by UE but rejected by NW-A, UE should fall back to use priority-based drop solution.****Proposal 3: When the distance of two MUSIM gap occasions is no larger than 4ms but not physically overlapped, UE is not supposed to be scheduled between the kept MUSIM gap occasions.****Proposal 4: When a MUSIM gap collides with a legacy gap without priority, requirements shall not apply.**  |
| [**R4-2319985**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319985.zip) | Huawei, HiSilicon | **Proposal 1: Do not define constraints on MUSIM gap request from UE side.****Proposal 2: When “keep solution” is indicated by UE and NW A does not grant UE to use ‘keep solution’, UE behaviour is not specified.****Proposal 3: RAN4 not to make further clarification on aperiodic MUSIM gap request.****Proposal 4: UE can always be scheduled between kept MUSIM gaps.****Proposal 5: When number of colliding MUSIM and/or Type 2 gaps is more than two and one of the colliding gaps is aperiodic MUSIM gap, collision with aperiodic MUSIM gap is resolved first before the collision with periodic MUSIM or Type 2 gaps.****Proposal 6: When a MUSIM gap collides with a Type-1 MG, prioritize the gap with longer MGRP. No requirements apply if the two gaps have same MGRP.** |
| [**R4-2320294**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2320294.zip) | Nokia, Nokia Shanghai Bell | 1. There need to be a reasonable balance between the UE NW-B requirements and the MUSIM gap pattern(s).
2. There shall be a minimum MGRP defined for the requested MUSIM gap pattern.
3. UE is not required performing NW-B inter-frequency measurements.
4. The UE shall at least support MUSIM MGRP of 160ms.
5. Support P2. Priority based solution can always be applied if keep solution is not granted.
6. A UE supporting MUSIM gaps shall at least support priority based solution.
7. A UE supporting MUSIM gaps may support keep solution.
8. UE requesting an aperiodic MUSIM gap while one aperiodic gap is ‘pending’ the new aperiodic gap (if allocated) will overwrite the pending aperiodic gap.
9. RAN4 to define under which conditions the UE can be scheduled in a gap between kept MUSIM gaps.
10. No need for further clarifications regarding: When number of colliding gaps is more than two with mix of periodic MUSIM, aperiodic MUSIM gap and MGs
11. Introduce priority for Type-1 gaps.
12. The Type-1 gap priority is only applied when MUSIM gaps are configured.
 |
| [**R4-2320297**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2320297.zip) | Nokia, Nokia Shanghai Bell | CR |
| [**R4-2320559**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2320559.zip) | ZTE Corporation | **Proposal 1: When UE requests the MUSIM gaps, the MGRP of highest priority gap should be larger than 160ms; When UE requests only one MUSIM gap, the MGRP should be larger than 80ms.****Proposal 2: Collision is be handled based on the MGRP of the collided gaps (especially for Type-1 gaps).****Proposal 3: Priority based solution is used (fallback to priority based solution) when “keep solution” is not granted.****Observation 1: Collisions between gaps are resolved sequentially in order of decreasing priority, starting with the gap that has the highest priority. “Keep solution” is used for the remaining non-dropped MUSIM gaps.** **Observation 2: Aperiodic MUSIM gap is always kept (not dropped) from UE perspective in case of collisions with other gaps (i.e. all gaps including MUSIM gaps, MGs, etc)****Proposal 4: When priority based solution is used for MUSIM gap collision handling, only aperiodic MUSIM gap will be left. When “keep” solution is used for MUSIM gap collision handing, all MUSIM gaps will be kept**. |
| [**R4-2320907**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2320907.zip) | Qualcomm Incorporated | **Proposal 1: Do not define additional constraints on MUSIM gap priority request from UE side.****Proposal 2: Collisions between a MUSIM gap and a Type-1 MG are resolved based on the MGRP of the gaps.*** **The gap with the longer MGRP is prioritized.**
* **No requirements apply if the two gaps have same MGRP.**

**Proposal 3: If network rejects a UE request to use the “keep solution” for MUSIM gaps, no requirements apply in network B.** |
| [**R4-2321008**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2321008.zip) | MediaTek inc. | **Proposal 1: Do not define constraints on MUSIM gap request from UE side since NW has the option to deny UE’s request.****Proposal 2: UE shall fallback to priority-based solution if NW A rejects UE’s request on using “keep solution” to handle the collisions between different MUSIM gaps.****Proposal 3: For collision between MUSIM gap and Type-1 MG, collision is handled based on the MGRP of the collided gaps, the gap with larger MGRP is prioritized.****Proposal 4: If the MGRPs of the collided MUSIM gap and Type-1 MG are the same, then prioritize MUSIM gap only if it is configured with the highest priority level; otherwise prioritize Type-1 MG.****Proposal 5: Collision between handover and MUSIM gaps is handled in the same way as the collision between handover and legacy MG, i.e., no special handling solution is defined. No need to capture this conclusion in the specs.** |

## Open issues summary

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

### Sub-topic 2-1 MUSIM gap priority configuration

*Sub-topic description:*

*Open issues and candidate options before meeting:*

**Issue 2-1-1: Constraints on MUSIM gap request from UE side**

Moderator: Move this issue to topic 1 since this topic is not related to MUSIM gap priority configuration any more.

### Sub-topic 2-2 On collision between different MUSIM gaps

*Sub-topic description*

*Open issues and candidate options before meeting:*

**Issue 2-2-1: UE behaviour when “keep solution” is indicated by UE and NW A rejects the ‘keep solution’ indication**

* Proposals
	+ P1: Requirements in network B do not apply (Qualcomm)
	+ P2: Priority based solution is used (fallback to priority based solution) when “keep solution” is not granted (Apple, Xiaomi, China Telecom, CMCC, Ericsson, vivo, oppo, Nokia, ZTE, MTK)

*Recommendations:* Agree P2

**Issue 2-2-2: Clarification on “priority base solution” and “keep solution”**

* Proposals
	+ P1: A UE supporting MUSIM gaps shall at least support priority based solution. A UE supporting MUSIM gaps may support keep solution. (Nokia)

*Recommendations:* Agree P1

**Issue 2-2-3: On aperiodic MUSIM gap request**

* Proposals
	+ P1: UE requests an aperiodic while one aperiodic gap is ‘pending’ the new aperiodic gap (if allocated) will overwrite any pending aperiodic gap. (Nokia)
	+ P2: When UE requests new MUSIM gap and NW configures the MUSIM gaps, the MUSIM gaps requested before shall be overwritten. The issue shall be discussed in RAN2 (Ericsson)
	+ P3: RAN4 not to make further clarification on aperiodic MUSIM gap request (Huawei)

*Recommendations:* To moderator’s understanding on RAN2 specs, when new MUSIM gaps are requested and configured, the “old” MUSIM gaps will be overwritten. It is a purely RAN2 issue.

Close this issue without any clarification.

**Issue 2-2-4: On scheduling when MUSIM gaps are not overlapping and the distance between the two MUSIM occasions is equal to or smaller than 4ms**

* Proposals
	+ P1: Define under which conditions the UE can be scheduled in the gap between kept MUSIM gaps (the gap length is 0<gap<4ms) (China Telecom, vivo, Nokia)
	+ P2: The UE cannot be scheduled within this gap (vivo oppo)
	+ P3: UE can always be scheduled between kept MUSIM gaps (Huawei)

*Recommendations:* Suggest to consider P1

### Sub-topic 2-3 On collision between MUSIM and legacy gaps

**Issue 2-3-1 Clarifications on collision between Type-2 MG and MUSIM gaps**

**Issue 2-3-1-1 When number of colliding gaps is more than two with mix of periodic MUSIM, aperiodic MUSIM gap and MGs**

* Proposals
	+ P1: If the aperiodic gap collides with both periodic MUSIM gaps and Type-2 MG, the agreement in RAN4#108bis also applies by treating the aperiodic MUSIM gap as the highest priority. (China Telecom)
	+ P2: For aperiodic MUSIM gaps, agreement in [R4-2317425] for issue 2-3-1-1 and 2-3-1-2 is sufficient to cover collision cases where an aperiodic MUSIM involves (vivo Nokia)
	+ P3: When number of colliding MUSIM and/or Type 2 gaps is more than two and one of the colliding gaps is aperiodic MUSIM gap, collision with aperiodic MUSIM gap is resolved first before the collision with periodic MUSIM or Type 2 gaps (Huawei)
	+ P4: When priority based solution is used for MUSIM gap collision handling, only aperiodic MUSIM gap will be left. When “keep” solution is used for MUSIM gap collision handing, all MUSIM gaps will be kept. (ZTE)

*Recommendations:* To moderator’s understanding, either P1 and P2 means based on existing agreement the case is clear. P3 is covered by previous agreements in [R4-2317425] for issue 2-3-1-1 and 2-3-1-2. P4 is the original P1 and is right, however it has been covered by previous agreement.

Suggest to close this issue without any further clarification.

**Issue 2-3-2: Solutions for collision between MUSIM gap and any measurement gap without assigned priority**

* Proposals
	+ P1: When a MUSIM gap collides with a legacy MG, requirements shall not apply if any one of the collided gaps is not assigned a priority. (Apple xiaomi oppo)
	+ P2: Collision is handled based on the MGRP of the collided gaps (Ericsson vivo Huawei ZTE Qualcomm MTK)
		- P2-1: In a collision, prioritize the gap with longer MGRP when any measurement gaps in the collision gaps is not assigned a priority; (Ericsson vivo Huawei MTK Qualcomm)
		- P2-2: No requirements apply if any of the two gaps in a collision have the same MGRP. (Ericsson vivo Huawei Qualcomm)
		- P2-3: If the MGRPs of the collided MUSIM gap and Type-1 MG are the same, then prioritize MUSIM gap only if it is configured with the highest priority level; otherwise prioritize Type-1 MG (MTK)
		- P2-4: The gap pattern with longer MGRP implicitly is implied to have higher priority. In case of collision between multiple MUSIM and measurement gap occasions, collision between gaps are resolved sequentially in order of decreasing MGRP, starting with the gap that has the longest MGRP. When “keep solution” is granted, UE keeps all remaining non-dropped colliding periodic and aperiodic MUSIM gaps. (vivo)
	+ P3: Introduce priority for Type-1 MG; the Type-1 gap priority is only applied when MUSIM gaps are configured (Nokia)
	+ P4: If priorities are not assigned for Rel-18 MUSIM gaps, no requirements apply (including collision with either Type-1 or Type-2 gaps). (vivo)

*Recommendations: Based on majority view could companies compromise to P2 with P2-1, P2-2 and P2-4?*

*P2-4 is necessary when multiple MUSIM gaps collide with a Type-1 gap.*

### Sub-topic 2-4 On collision between MUSIM gaps and NW A signals

# Topic #3: On network A requirements

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2318612**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2318612.zip) | Apple | **Proposal 1: not mix MUSIM with NTN, PDCP and so on.****Proposal 2: impact of MUSIM gap on network A requirements:*** **Update definition of W: For a window W of duration max(SMTC period, MGRP\_max), where MGRP max is the maximum MGRP across all configured per-UE measurement gap and/or per-FR measurement gap within the same FR as the SSB frequency layer, including configured periodic MUSIM gap, and starting from the beginning of any SMTC occasion.**
* **Existing definition of Ntotal and Navailable can be reused.**
* **For intra-frequency and inter-frequency measurement without gap**
	+ **Existing definition of Kp can still be reused, i.e. Kp = Ntotal / Navailable**
* **For intra-frequency and inter-frequency measurement with gap**
	+ **Existing definition of Kgap can be reused except the condition when Kgap = 1 needs to be updated:**
		- **Kgap = 1 when the UE is:**
			* **not configured with concurrent measurement gaps or not supporting [concurrent measurement gaps], and**
			* **not configured with MUSIM gaps or not supporting [MUSIM gaps].**
 |
| [**R4-2318868**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2318868.zip) | Xiaomi | CR |
| [**R4-2319035**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319035.zip) | China Telecom | CR |
| [**R4-2319138**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319138.zip) | Ericsson | ***Proposal 1: When UE performs a measurement without gap which is partially overlapping with the gap but fully overlapping with the union of the NW-A’s gap and MUSIM gaps, UE shall perform the measurement within MG. The requirement will be***Table 1: Time period for PSS/SSS detection, (Frequency range FR1)

|  |  |
| --- | --- |
| DRX cycle | TPSS/SSS\_sync\_intra |
| No DRX | max( 600ms, 5 x Kgap x max(MGRP, SMTC period)) x CSSFwithin\_gap,i |
| DRX cycle≤ 320ms | max( 600ms, ceil(M2x 5 x Kgap) x max(MGRP, SMTC period, DRX cycle)) x CSSFwithin\_gap,i |
| DRX cycle>320ms | ceil(5 x Kgap) x DRX cycle x CSSFwithin\_gap,i |

 |
| [**R4-2319241**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319241.zip) | vivo | **Proposal 1: Exclude the impact of MUSIM on NTN in Rel-18.** **Proposal 2: Exclude the impact of MUSIM on propagation delay compensation in Rel-18.**  |
| [**R4-2319491**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319491.zip) | OPPO | CR |
| [**R4-2319986**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319986.zip) | Huawei, HiSilicon | **Proposal 1: Descope MUSIM gaps impact on NTN requirements in Rel-18.****Proposal 2: MUSIM gaps have higher priority when colliding with PRS/TRS for PDC measurement.****Proposal 3: No requirement apply for L1 measurement when L1 measurement occasions are fully overlapping with the union of MUSIM gap and measurement gap occasions.** |
| [**R4-2319987**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319987.zip) | Huawei, HiSilicon | CR |
| [**R4-2320295**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2320295.zip) | Nokia, Nokia Shanghai Bell | 1. Support option P1. RAN4 does not consider MUSIM gaps impact on NTN requirements in R18.
2. While UE is performing measurements for propagation delay compensation, the UE will drop any overlapping MUSIM gaps.
 |
| [**R4-2321009**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2321009.zip) | MediaTek inc. | **Proposal 1: Requirements do not apply for intra-frequency measurement without MG if Navailable = 0 due to fully overlapping between SMTC occasions and the union of MUSIM gap and measurement gap occasions.****Proposal 2: Descope MUSIM gaps impact on NTN requirements in R18.** |

## Open issues summary

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

### Sub-topic 3-1 On network A requirements

*Sub-topic description:*

*Open issues and candidate options before meeting:*

**Issue 3-1-1: MUSIM gap impact on NTN**

* Proposals
	+ P1: Exclude MUSIM gaps impact on NTN requirements in R18

*Recommendations: Agree P1*

**Issue 3-1-2: MUSIM gap impact on Measurement requirement for Propagation Delay Compensation**

* Proposals
	+ P1: While UE is performing measurements for propagation delay compensation, the UE will drop any overlapping MUSIM gaps (Nokia)
	+ P2: Exclude the combination between MUSIM and propagation delay compensation in Rel-18. (Apple vivo)
	+ P3: MUSIM gaps have higher priority MUSIM gaps when colliding with PRS/TRS for PDC measurement. (Huawei)

*Recommendations: Suggest to compromise to P2*

**Issue 3-1-3: SSB or SMTC occasions are fully overlapping with the union of MUSIM gap and measurement gap occasions within the window W**

* Proposals
	+ P1: When UE performs a measurement without gap which is partially overlapping with the gap but fully overlapping with the union of the NW-A’s gap and MUSIM gaps, UE shall perform the measurement within MG. (Ericsson)
	+ P2: No requirement apply for corresponding L1 measurement or intra-frequency measurement. (Huawei MTK)

*Recommendations: Suggest to agree P2*

**Issue 3-1-3: On parameters for NW A measurement requirements**

* Proposals

P1: impact of MUSIM gap on network A requirements:

* Update definition of W: For a window W of duration max(SMTC period, MGRP\_max), where MGRP max is the maximum MGRP across all configured per-UE measurement gap and/or per-FR measurement gap within the same FR as the SSB frequency layer, including configured periodic MUSIM gap, and starting from the beginning of any SMTC occasion.
* Existing definition of Ntotal and Navailable can be reused.
* For intra-frequency and inter-frequency measurement without gap
	+ Existing definition of Kp can still be reused, i.e. Kp = Ntotal / Navailable
* For intra-frequency and inter-frequency measurement with gap
	+ Existing definition of Kgap can be reused except the condition when Kgap = 1 needs to be updated:
		- Kgap = 1 when the UE is:
			* not configured with concurrent measurement gaps or not supporting [concurrent measurement gaps], and
			* not configured with MUSIM gaps or not supporting [MUSIM gaps].

*Recommendations: Consider suggestions in P1 in CR*

# Topic #4: On network B requirements

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2318613**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2318613.zip) | Apple | **Proposal 1: Update the agreement on NW B requirements to include inactive state as: Define NW B measurement/cell reselection requirements in IDLE/inactive mode only.****Proposal 2: The inactive state requirement should be the same as NW B’s Idle state.****Proposal 3: Add the condition “MUSIM gaps will not be dropped due to collision with other MUSIM gaps” when defining NW B requirements.****Proposal 4: The measurement/cell reselection requirements in IDLE/inactive mode for NW B could reuse the existing idle/inactive requirements as the baseline.****Proposal 5: With DRX cycle replaced by max(DRX cycle, MGRP\_max), where MGRP\_max is the maximum MGRP among all configured MUSIM gaps.****Proposal 6: For MUSIM gap with 5.12s MGPR, new requirement for 5.12s should be defined.****Proposal 7: The new requirements for 5.12s could reuse corresponding requirements when DRX = 2.56s.****Proposal 8: Do not define test cases to verify any new requirements in network B.** |
| [**R4-2318614**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2318614.zip) | Apple | CR |
| [**R4-2318869**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2318869.zip) | Xiaomi | **Proposal 1:** **RAN4 to update the agreement on NW B requirements to include inactive state.****Proposal 2: For Network B requirements, we propose:*** **Alt1: to reuse the existing IDLE/INACTIVE mode requirements as baseline with DRX cycle replaced by max(DRX cycle, MGRP\_max), where MGRP\_max is the maximum MGRP among all configured MUSIM gaps;**
* **Alt2: to introduce a fixed scaling factor N based on the DRX cycle, but the requirements not apply for the case MUSIM MGRP=5.12s.**
 |
| [**R4-2319034**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319034.zip) | China Telecom | **Proposal 1: Agree to define NW B measurement/cell reselection requirements in IDLE/inactive mode, and the inactive state requirement should be the same as NW B’s Idle state.****Proposal 2: Support new option 2 that NW-B’s requirement is not related to MGRP, and with a fixed scaling factor N based on the DRX cycle. And UE should request MUSIM gaps based on the defined NW B requirements. We can accept N=4.****Proposal 3: If new option 2 in Issue 4-1-2 is agreed, there is no need to define additional NW B requirements when MGRP=5.12s.** **Proposal 4: Support to not define inter-frequency measurement requirements for NW B.** |
| [**R4-2319102**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319102.zip) | CMCC | ***Proposal 1: Update the agreement on NW B requirements to include inactive state as: Define NW B measurement/cell reselection requirements in IDLE/inactive mode only******Proposal 2: for NW-B cell reselection requirements definition, it is proposed to take existing idle/inactive mode cell reslection requirments as baseline, with following updates:**** ***if it is agreed to define the mandatory MUSIM gap patterns, DRX cycle is replaced by max(DRX cycle, MGRP), MGRP is the MGRP of the mandatory gap pattern***
* ***Otherwise, the solution that NW-B’s requirement is not related to MGRP, and NW-B’s requirement is specified with a fixed scaling factor N based on the DRX cycle.***

***Proposal 3: for NW B cell reselection requirements definition, it is proposed to add requirements for MUSIM gaps*** ***repetition period of 5120ms.******Proposal 4: it is proposed to define NW B inter-frequency requirements.***  |
| [**R4-2319139**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319139.zip) | Ericsson | ***Observation 1: NW-B doesn’t know any NW-A’s MUSIM gap info from UE* side.*****Observation 2: The minimum space of the measurement samples for serving cell evaluation is DRX cycle and the minimum space of the measurement samples for intra-frequency/inter-frequency measurement is 1.28s.******Proposal 1: Update the agreement on NW B requirements to include INACTIVE state. The requirement can be the same as NW B’s IDLE state.*** ***Proposal 2: The network B requirements is not related to MGRP, and with a fixed scaling factor N based on the DRX cycle.******Proposal 3: N=4 provided that UE supports at least one of MUSIM gap pattern with MGRP=1.28s and/or 2.56s.******Proposal 4: RAN4 not to discuss the requirement for MGRP=5.12s if the NW-B’s requirement is only defined by NW-B’s DRX.******Proposal 5: RAN4 not to define NW-B’s inter-frequency measurement requirement provided that UE supports at least one of MUSIM gap pattern with MGRP=1.28s and/or 2.56s.******Proposal 6: RAN4 not to discuss the solution when different MGRPs are used for NW-B’s measurement if the NW-B’s requirement is only defined by NW-B’s DRX.******Proposal 7: RAN4 to discuss the test case issue in performance part directly.*** |
| [**R4-2319242**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319242.zip) | vivo | **Observation 1: For a UE with MUSIM gap configuration, performing NW B inter-frequency measurement using MUSIM gaps for mobility purpose maybe less important compared with the scenario where a UE is purely in the idle/inactive state of one network and performs idle/inactive state inter-frequency measurement for mobility purpose. For this reason, network B inter-frequency requirements may not need be defined.****Proposal 1: Define NW B measurement/cell reselection requirements in IDLE/inactive mode, the inactive state requirement should be the same as that NW B’s Idle state.****Proposal 2: The measurement/cell reselection requirements in IDLE/inactive mode for NW B is determined by applying a fixed scaling factor N on the legacy idle/inactive state requirements. N could be selected from 4 or 6. The network B requirements is not related to MGRP.****Proposal 3: If option 2 is used for issue 4-1-2, i.e., the network B requirement is not related to MGRP of MUSIM gaps, there is no need to define new requirements for MGRP = 5.12s.** **Proposal 4: Prefer do not define NW B idle/inactive state inter-frequency measurement requirements.** **Proposal 5: Discuss issue 4-1-5 after issue 4-1-2 and 4-1-4 is clear.**  |
| [**R4-2319492**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319492.zip) | OPPO | **Proposal 1: Define the same NW-B requirements for both RRC IDLE and RRC INACTIVE states, where MUSIM gaps is not collided or keep solution is used.** **Proposal 2: The NW-B requirements is defined based on min(N\*DRX cycle, 5.12s), provided that the MGRP requested by UE should not be larger than N\*DRX cycle.****Proposal 3: Do not define test cases to verify any new requirement in NW-B.** |
| [**R4-2319988**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319988.zip) | Huawei, HiSilicon | **Proposal 1: Define NW B measurement/cell reselection requirements in IDLE/INACTIVE mode.****Proposal 2: Existing IDLE mode requirements are reused for NW B with a relaxation factor of 4.****Proposal 3: RAN4 to define cell reselection requirements with 5.12s measurement cycle. Number of DRX cycles for 2.56s DRX cycle are used as baseline.****Proposal 4: RAN4 not to define inter-frequency requirements for NW B.** |
| [**R4-2320296**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2320296.zip) | Nokia, Nokia Shanghai Bell | 1. RAN4 only one set of requirements for NW-B requirements when UE is allocated with MUSIM gaps.
2. NW-B requirements when UE is allocated with MUSIM gaps are the same as current Idle mode measurement requirements.
3. When discussing NW-B requirements RAN4 need to consider the allocated MUSIM gaps, the assumed number of carriers required to be measured, is the assumption using same requirements as NW-A idle mode etc.

Network B requirements framework:1. NW-B measurement requirements are based on NW-B DRX cycle.
2. RAN4 to discuss the consequence of the network not allocating all UE requested MUSIM gaps.
3. RAN4 to clarify whether any UE MUSIM requirements apply if network does not allocate all requested MUSIM gaps.
4. For NW-B measurement requirements, the ‘DRX cycle’ in current requirements is replaced with ‘Max(DRX cycle, Min(MUSIM gap MGRP))’.
5. (MUSIM gap MGRP) includes the MGRP from all the UE configured periodic MUSIM gaps.
6. Clarify if RAN4 will define NW-B measurements for FR2-1 and FR-2-2.
7. Remove the M1 scaling factor from Nserv for NW-B.
8. Nserv for NW-B:

|  |  |  |
| --- | --- | --- |
| Max(DRX cycle, Min(MUSIM gap MGRP)) [s] | Scaling Factor (N1) | Nserv [number of DRX cycles] |
|  | FR1 | FR2-1Note1 | FR2-2 Note2 |  |
| **0.32** | **1** | **8** | **12** | **~~M1\*~~N1\*4** |
| **0.64** |  | **5** | **8** | **~~M1\*~~N1\*4** |
| **1.28** |  | **4** | **6** | **N1\*2** |
| **2.56** |  | **3** | **5** | **N1\*2** |
| **Note 1: Applies for UE supporting FR2-1 power class 2&3&4. For UE supporting FR2-1 power class 1 or 5, N1 = 8 for all DRX cycle length.****Note 2: Applies for UE supporting FR2-2 power class 2&3. For UE supporting FR2-2 power class 1, N1 = 12 for all DRX cycle length.****Note 3: Min(MUSIM gap MGRP) is the minimum MGRP among all allocated periodic MUSIM gaps.** |

Requirement when MGRP = 5.12s:1. Define requirements for MUSIM gap with 5.12s MGRP.

NW B inter-frequency and inter-RAT measurement:1. Clarify the need for UE performing NW-B inter-frequency.
2. RAN4 to define UE requirements for NW-B inter-frequency measurements only if these are introduced.
3. RAN4 will not define NW-B inter-frequency measurement requirements.

Network B requirements test case:1. Do not exclude defining test cases to verify new MUSIM requirements.
 |
| [**R4-2320908**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2320908.zip) | Qualcomm Incorporated | **Proposal 1: Do not define test cases to verify any new requirements in network B.****Proposal 2: Postpone the discussion of additional conditions for defining Network B requirements until there is agreement on the framework for defining the requirements (issue 4-1-2).****Proposal 3: For cell reselection requirements in IDLE mode in NW B,*** **Reuse the existing requirements with a relaxation factor of 4.**
 |
| [**R4-2321010**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2321010.zip) | MediaTek inc. | **Proposal 1: NW B requirement need to be related to MUSIM gap’s MGRP as max(DRX cycle, MGRP\_max); otherwise, requirements does not apply.****Proposal 2: The new requirements for 5.12s could reuse corresponding requirements (number of DRX cycles) when DRX = 2.56s****Proposal 3: Do not define NW B inter-frequency requirements.****Proposal 4: Do not define test cases to verify any new requirements in network B.** |

## Open issues summary

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

### Sub-topic 4-1 On network B requirements

*Sub-topic description:*

*Open issues and candidate options before meeting:*

**Issue 4-1-1: Network B requirements conditions**

* Proposals
	+ P1: Update the agreement on NW B requirements to include inactive state as: Define NW B measurement/cell reselection requirements in IDLE/inactive mode only (Apple xiaomi China Telecom CMCC Ericsson vivo oppo Huawei)
		- P1-1: The inactive state requirement should be the same as NW B’s Idle state (Apple China Telecom Ericsson vivo oppo)
	+ P2: Add the condition “MUSIM gaps will not be dropped due to collision with other MUSIM gaps” when defining NW B requirements (Apple)
	+ P3: RAN4 only one set of requirements for NW-B requirements when UE is allocated with MUSIM gaps. Re-discuss the conditions for the RAN4#106 agreement once network B requirements are clearer. Continue discussion other conditions during or once NW B requirements are agreed. (Nokia)
	+ P4: Postpone the discussion of additional conditions for defining Network B requirements until there is agreement on the framework for defining the requirements (issue 4-1-2). (Qualcomm)

*Recommendations: Suggest to agree P1 and P1-1 based on majority view.*

**Issue 4-1-2: Network B requirements framework**

* Proposals
	+ Option 1: The network B requirement is related to MGRP, with DRX cycle replaced by max(DRX cycle, MGRP\_max), where MGRP\_max is the maximum MGRP among all configured MUSIM gaps. (Apple xiaomi MTK)
		- Option 1-1: DRX cycle is replaced by max(DRX cycle, MGRP), MGRP is the MGRP of the mandatory gap pattern (CMCC)
		- Option 1-2: For NW-B measurement requirements, the ‘DRX cycle’ in current requirements is replaced with ‘Max(DRX cycle, Min(MUSIM gap MGRP)), (MUSIM gap MGRP) includes the MGRP from all the UE configured periodic MUSIM gaps (Nokia)
	+ Option 2: The network B requirements is not related to MGRP, and with a fixed scaling factor N based on the DRX cycle. (xiaomi, China Telecom, CMCC, Ericsson, vivo, oppo, Huawei, Qualcomm)
		- Option 2a: N = 4, and other values are not precluded. (China telecom, Ericsson vivo, Huawei, Qualcomm)
		- Option 2b: The NW-B requirements is defined based on min(N\*DRX cycle, 5.12s), provided that the MGRP requested by UE should not be larger than N\*DRX cycle. (oppo)

*Recommendations: This issue has been discussed for a few meetings and based on majority view, suggest companies to check whether option 2 can be used as the compromise solution.*

**Issue 4-1-2-1: Impact on NW B requirements if network does not allocate all requested MUSIM gaps.**

* Proposals
	+ P1: RAN4 to clarify whether any UE MUSIM requirements apply if network does not allocate all requested MUSIM gaps. (Nokia)

*Recommendations: Discuss the proposal*

**Issue 4-1-3: Requirement when MGRP = 5.12s**

* Proposals
	+ P1: For MUSIM gap with 5.12s MGPR, new requirement for 5.12s could be defined. (Apple CMCC Huawei MTK Nokia)
		- P1-1: The new requirements for 5.12s could reuse corresponding requirements (number of DRX cycles) when DRX = 2.56s. (Apple Huawei MTK)
	+ P2: RAN4 not need to define the requirement for MGRP=5.12s if the NW-B’s requirement is only related to NW-B’s DRX. (xiaomi, China telecom, Ericsson, vivo)

*Recommendations: Depending on issue 4-1-2.*

**Issue 4-1-4: NW B inter-frequency and inter-RAT measurement**

* P1: Do not define NW B inter-frequency requirements (China Telecom, Apple, vivo, Huawei, Ericsson, MTK, Nokia)
	+ P1-1: RAN4 not to define NW-B’s inter-frequency measurement requirement provided that UE supports at least one of MUSIM gap pattern with MGRP=1.28s and/or 2.56s (Ericsson)
	+ P1-2: Clarify the need for performing inter-frequency in NW-B (Nokia)
* P2: Define NW B inter-frequency requirements (CMCC)

*Recommendations: Based on majority view suggested NW B inter-frequency requirements are not defined*

**Issue 4-1-5: Solutions when different MGRPs are used for measurement**

* Proposals
	+ P1: RAN4 not to discuss the solution when different MGRPs are used for NW-B’s measurement if the NW-B’s requirement is only defined by NW-B’s DRX (Ericsson)
	+ P2: Postpone after conclusion of Issue 4-1-2 (vivo)

*Recommendations: Postpone after issue 4-1-2 is clear*

**Issue 4-1-6: Others**

* Proposals
	+ P1: Clarify if RAN4 will define NW-B measurements for FR2-1 and FR-2-2. (Nokia)
	+ P2: Remove the M1 scaling factor Nserv for NW-B (Nokia)

*Recommendations: Companies check whether P1 and P2 is agreeable. Related update can be discussed directly in the CR*

# Topic #5: Performance part

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2319104**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319104.zip) | CMCC | ***Proposal 1: it is proposed to define tests for following collision cases:**** ***collision between different MUSIM gaps***
* ***collision between MUSIM gaps and legacy gaps***
* ***collision between MUSIM gaps and NW A signals***

***Proposal 2: for collision between different MUSIM gaps, it is proposed to define tests for both priority based solution and keep solution.******Proposal 3: it is proposed to define tests for collision between Type-2 MG and MUSIM gaps and the number of colliding gaps is more than two with mix of MUSIM gaps and MGs.******Proposal 4: it is proposed to define test cases to verify network B requirements.*** |
| [**R4-2319141**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319141.zip) | Ericsson | **Observation 1: All MUSIM gaps’ behaviours are triggered by UE other than NW.*****Proposal 1: RAN4 to agree the following general pricinples to define MUSIM test cases.**** ***Only SA, per-UE gap***
* ***Non-DRX only***
* ***Without SBI reporting***
* ***Only consider SSB measurement in NW-A***
* ***Both MUSIM gap colliding with Type-2 gap and Type-1 gap***
* ***Both MUSIM priority rule and keep rule***

***Proposal 2: To simplify the test, RAN4 to agree only test MUSIM gap pattern #16.******Proposal 3: RAN4 to discuss how to verify the expected MUSIM gaps behaviour following the test cases expected.**** ***FFS the verification of MUSIM gap patterns***
* ***FFS the verification of collision rules***
* ***FFS the verification of aperiodic gaps***
 |
| [**R4-2319238**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319238.zip) | vivo | Work plan |
| [**R4-2319243**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319243.zip) | vivo | **Proposal 1: Use the following principles for MUSIM test case design*** **Scenario: only define test cases for NR SA scenario for FR1 and FR2**
* **L1 impact: no test case defined for L1 impact**
* **Intra-frequency measurement: no test case for intra-frequency measurement**
* **DRX: test cases for non-DRX only**
* **SBI reporting: Define test case without SBI reporting**
* **Measurement target: consider SSB only**
* **Simultaneously per-UE gap and per-FR gap: all gaps in the test case are per UE gaps only**
* **Overlapping scenario: only consider fully non-overlap and partially partial overlap cases**

**Proposal 2: the following rules should be considered in the test case design*** **Type of gaps to be considered: MUSIM and type-2 gaps, FFS on Type-1 gap**
* **Number of MUSIM gaps in the test cases: 2 periodic MUSIM gaps in the test case design**
* **Number of Type-2(1) gaps in the test cases: 1 Type-2 gap. FFS on whether 1 Type-1 gap.**
* **Aperiodic MUSIM gap: FFS on whether independent test cases are designed for aperiodic MUSIM gap.**
* **Gap pattern: For MUSIM gaps, suggest to use MUSIM gap pattern 1 and 20, for Type-2 gap, suggest to use gap pattern 1.**
* **Gap pattern configuration: MUSIM gap patterns used in the test, together with other information like priority or “keep solution”, can be directly configured by NW A.**
* **Priority or collision handling solution for MUSIM gaps indicated by UE: no separate test case defined, verified by other test cases**
* **Network B test case: no test case for network B requirements**

**Proposal 3: Suggest to consider the following test cases initially:*** **TC1: Type-2 + periodic MUSIM gap, with non-overalpping among all configured gaps, SSB-based measurements, FR1, inter-frequency layer**
* **TC2: Type-2 + periodic MUSIM gap, with partially partial overlapping among all configured gaps, “keep solution” for MUSIM gap collision handling, SSB-based measurements, FR1, inter-frequency layer**
* **TC3: Type-2 + periodic MUSIM gap, with partially partial overlapping among all configured gaps, “priority based solution” for MUSIM gap collision handling, SSB-based measurements, FR1, inter-frequency layer**
* **TC4: Type-2 + periodic MUSIM gap, with non-overalpping among all configured gaps, SSB-based measurements, FR2, inter-frequency layer**
* **TC5: Type-2 + periodic MUSIM gap, with partially partial overlapping among all configured gaps, “keep solution” for MUSIM gap collision handling, SSB-based measurements, FR2, inter-frequency layer**
* **TC6: Type-2 + periodic MUSIM gap, with partially partial overlapping among all configured gaps, “priority based solution” for MUSIM gap collision handling, SSB-based measurements, FR2, inter-frequency layer**
 |
| [**R4-2319989**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319989.zip) | Huawei, HiSilicon | **Proposal 1: RAN4 to define the following sets of RRM test cases for MUSIM.*** **TC set 1: intra-frequency event triggered reporting, one MUSIM gap overlapping with SMTC**
* **TC set 2: inter-frequency event triggered reporting, one MUSIM gap overlapping with MG, MUSIM gap higher priority than MG**
* **TC set 3: inter-frequency event triggered reporting, one MUSIM gap overlapping with MG, MUSIM gap lower priority than MG**
* **TC set 4: SSB based RLM, one MUSIM gap overlapping with SSB, MG overlapping with SSB, MUSIM gap not overlapping with MG**
* **TC set 5: SSB based L1-RSRP, one MUSIM gap overlapping with SSB, MG overlapping with SSB, MUSIM gap overlapping with MG, MUSIM gap higher priority than MG**

**Proposal 2: RAN4 to discuss how to trigger UE to request MUSIM gaps in the test case.****Proposal 3: RAN4 to discuss whether and how to define test case for collision handling for multiple MUSIM gaps based on the outcome of how to trigger UE to request MUSIM gaps.****Proposal 4: Do not define test cases for NW B requirements.** |
| [**R4-2320298**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2320298.zip) | Nokia, Nokia Shanghai Bell | 1. Define test cases, for a UE supporting priority-based MUSIM gap solution, verifying correct handling of priorities between measurement gaps and MUSIM gaps.
2. measurement Define test cases for NW-B measurement requirements without collision between measurement gaps and MUSIM gaps.
3. Define test cases for NW-B measurement requirements with collisions between measurement gaps and MUSIM gaps.
4. Define test cases for NW-B measurement requirements with collisions between measurement gaps and MUSIM gaps.
 |
| [**R4-2320909**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2320909.zip) | Qualcomm Incorporated | **Proposal 1: Do not define test cases to verify any MUSIM requirements in network B.** |
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|  |  |  |
|  |  |  |

### Sub-topic 5-1 Performance

*Sub-topic description:*

*Open issues and candidate options before meeting:*

**Issue 5-1-1: Test case design principles**

* Proposals
* P1: (vivo)
	+ Scenario: only define test cases for NR SA scenario for FR1 and FR2
	+ L1 impact: no test case defined for L1 impact
	+ Intra-frequency measurement: no test case for intra-frequency measurement
	+ DRX: test cases for non-DRX only
	+ SBI reporting: Define test case without SBI reporting
	+ Measurement target: consider SSB only
	+ Simultaneously per-UE gap and per-FR gap: all gaps in the test case are per UE gaps only
	+ Overlapping scenario: only consider fully non-overlap and partially partial overlap cases
	+ Type of gaps to be considered: MUSIM and type-2 gaps, FFS on Type-1 gap
	+ Number of MUSIM gaps in the test cases: 2 periodic MUSIM gaps in the test case design
	+ Number of Type-2(1) gaps in the test cases: 1 Type-2 gap. FFS on whether 1 Type-1 gap.
	+ Aperiodic MUSIM gap: FFS on whether independent test cases are designed for aperiodic MUSIM gap.
	+ Gap pattern: For MUSIM gaps, suggest to use MUSIM gap pattern 1 and 20, for Type-2 gap, suggest to use gap pattern 1.
	+ Gap pattern configuration: MUSIM gap patterns used in the test, together with other information like priority or “keep solution”, can be directly configured by NW A.
	+ Priority or collision handling solution for MUSIM gaps indicated by UE: no separate test case defined, verified by other test cases
* P2: (CMCC)
	+ collision between different MUSIM gaps
	+ collision between MUSIM gaps and legacy gaps
	+ collision between MUSIM gaps and NW A signals
* P3: (Ericsson)
	+ Only SA, per-UE gap
	+ Non-DRX only
	+ Without SBI reporting
	+ Only consider SSB measurement in NW-A
	+ Both MUSIM gap colliding with Type-2 gap and Type-1 gap
	+ Both MUSIM priority rule and keep rule
	+ To simplify the test, RAN4 to agree only test MUSIM gap pattern #16.

*Recommendations: Discuss proposals*

**Issue 5-1-2: On UE request MUSIM gaps**

* Proposals
	+ P1: MUSIM gap patterns used in the test, together with other information like priority or “keep solution”, can be directly configured by NW A. (vivo)
	+ P2: RAN4 to discuss how to trigger UE to request MUSIM gaps in the test case (Huawei)

*Recommendations: Suggest to agree P1*

**Issue 5-1-3: NW B test**

* Proposals
	+ P1: Define NW B test cases (Nokia CMCC)
	+ P2: No test case for NW B (Qualcomm Huawei Apple oppo MTK vivo)

*Note: move NW B test case topic from topic #4 to topic #5*

*Recommendations:*

**Issue 5-1-4: Test case list**

* Proposals
	+ P1:
		- TC1: Type-2 + periodic MUSIM gap, with non-overalpping among all configured gaps, SSB-based measurements, FR1, inter-frequency layer
		- TC2: Type-2 + periodic MUSIM gap, with partially partial overlapping among all configured gaps, “keep solution” for MUSIM gap collision handling, SSB-based measurements, FR1, inter-frequency layer
		- TC3: Type-2 + periodic MUSIM gap, with partially partial overlapping among all configured gaps, “priority based solution” for MUSIM gap collision handling, SSB-based measurements, FR1, inter-frequency layer
		- TC4: Type-2 + periodic MUSIM gap, with non-overalpping among all configured gaps, SSB-based measurements, FR2, inter-frequency layer
		- TC5: Type-2 + periodic MUSIM gap, with partially partial overlapping among all configured gaps, “keep solution” for MUSIM gap collision handling, SSB-based measurements, FR2, inter-frequency layer
		- TC6: Type-2 + periodic MUSIM gap, with partially partial overlapping among all configured gaps, “priority based solution” for MUSIM gap collision handling, SSB-based measurements, FR2, inter-frequency layer
	+ P2: (Huawei)
		- TC set 1: intra-frequency event triggered reporting, one MUSIM gap overlapping with SMTC
		- TC set 2: inter-frequency event triggered reporting, one MUSIM gap overlapping with MG, MUSIM gap higher priority than MG
		- TC set 3: inter-frequency event triggered reporting, one MUSIM gap overlapping with MG, MUSIM gap lower priority than MG
		- TC set 4: SSB based RLM, one MUSIM gap overlapping with SSB, MG overlapping with SSB, MUSIM gap not overlapping with MG
		- TC set 5: SSB based L1-RSRP, one MUSIM gap overlapping with SSB, MG overlapping with SSB, MUSIM gap overlapping with MG, MUSIM gap higher priority than MG

*Recommendations:*

# Topic #6: CR/Draft CR list

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| --- | --- | --- |
| **T-doc number** | **Title** | **Company** |
| [**R4-2318614**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2318614.zip) | CR for NW B inactive state requirements | Apple |
| [**R4-2318868**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2318868.zip) | draftCR on impact on RLM and link recovery due to MUSIM gaps | Xiaomi |
| [**R4-2319035**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319035.zip) | Draft CR on CSI-RS based L3 measurement impact due to MUSIM gap | China Telecom |
| [**R4-2319140**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319140.zip) | Draft CR on MUSIM NW-B requirement | Ericsson |
| [**R4-2319244**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319244.zip) | draft CR on genearl aspects for MUSIM gaps and collision handling | vivo |
| [**R4-2319245**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319245.zip) | Big CR to TS 38.133 on Dual TxRx Multi-SIM for NR | vivo |
| [**R4-2319491**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319491.zip) | [NR\_DualTxRx\_MUSIM-Core] CR on TRP specific Link Recovery Procedures due to MUSIM gaps | OPPO |
| [**R4-2319987**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319987.zip) | draftCR on NW A L1 measurement requirements with MUSIM gaps | Huawei, HiSilicon |
| [**R4-2320297**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2320297.zip) | NR\_DualTxRx\_MUSIM-Core DraftCR on Measurement for Propagation Delay Compensation | Nokia, Nokia Shanghai Bell |
| [**R4-2320561**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2320561.zip) | [NR\_DualTxRx\_MUSIM-Core]: Measurement gap related requirements of MUSIM gaps. | ZTE Corporation |
| [**R4-2320562**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2320562.zip) | [NR\_DualTxRx\_MUSIM-Core]: Positioning measurement impacted by MUSIM gap | ZTE Corporation |
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