**3GPP TSG-RAN WG4 Meeting # 102-e R4-22XXXX**

**Electronic Meeting, 21 Feb. – 03 March, 2022**

**Agenda item:** 10.26

**Source:** Moderator (vivo)

**Title:** Email discussion summary for [236] LTE\_NR\_MUSIM

**Document for:** Information

# Introduction

This email discussion is for R17 MUSIM WI and the scope covers the following agenda items:

* AI 10.26.1 General and work plan
* AI 10.26.2 RRM core requirements

At RAN 94 meeting, the revised WI for MUSIM [RP-213679] was approved. In the objectives of the WI, the following objective is added:

* Specify that existing gap patterns in TS 38.133 can be applicable for MUSIM and also define new gap patterns for MUSIM [RAN4]:

During email discussion companies are encourages to:

* Provide comments on all interested topics/sub-topics at one time
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# Topic #1: Rel-17 RRM for MUSIM

## Companies’ contributions summary

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| **Tdoc number** | **Company** | **Proposals / Observations** |
| R4-2203748 | Apple | **Proposal 1: longer MGL such 40ms and 80ms can be considered for aperiodic gap pattern.****Proposal 2: it is unnecessary to introduce the mandatory MGPs for MU-SIM once UE reporting to support MUSIM capability.****Proposal 3: It’s feasible to use multiple short aperiodic gaps for Msg1, Msg2, (Msg3, Msg4) transmission/reception or their combinations and multiple trials for On-demand SI request** |
| R4-2204161 | ZTE | **Observation 1: No need to define MGL larger than 20ms and MGRP larger than 5120ms for new periodic gap patterns for MUSIM.****Observation 2: No need to define MGL larger than 20ms for aperiodic gap pattern for MUSIM.****Proposal 1: One additional periodic gap may impact NW A performance.** |
| R4-2204307 | OPPO | **Proposal 1: MGL longer than 20ms is not considered for either periodic or aperiodic gap patterns.****Proposal 2: Not define mandatory new gap patterns for MUSIM.** **Proposal 3: It is feasible to configure 3 periodic gaps without sacrificing NW-A performance, if the overhead cap of gap combination does not exceed X%.*** **X=30 could be considered as baseline.**
 |
| R4-2204318 | vivo | **Proposal 1: For issue 1-2-1, use the MGL value in endorsed CR [7].****Proposal 2: For issue 1-2-2, conclude whether to introduce [5120ms MGRP and 20ms MGL]or not at RAN4 102e meeting.****Proposal 3: For issue 1-2-3, suggest that other candidate MGLs for aperiodic gap, especially longer MGL could be considered at later release instead of Rel-17.** **Proposal 4: After NE allows UE’s request on MUSIM gap for MUSIM measurement, further constraints are not needed. Suggest to use the above proposal for study in future release.** **Proposal 5: How a UE requests MUSIM gap for MUSIM measurement including OSI acquisition and On-demand SI acquisition is a pure UE implementation issue and no further enhancements/optimizations at Rel-17 time scale.****Proposal 6: A new UE capability for MUSIM gap should be introduced. Detailed design on signaling is up to RAN2 decision.****Proposal 7: Reply LS to RAN2 on MGL and MGRP should be based on RAN4’s endorsed CR.** **Proposal 8: Regarding 3 at RAN2’s LS, the scenario for 3 periodic gaps could be one periodic gap for serving cell measurement, one periodic for neighbour cell measurement and the other periodic gap for paging reception. Whether extra sacrificing on NW A compared with 2 periodic gap method needs more investigation.**  |
| R4-2204422 | Intel | **CR** |
| R4-2205394 | Huawei, HiSilicon | **Proposal 1: No new MGL is considered for periodic MUSIM gaps.****Proposal 2: No other MGL value is considered for aperiodic MUSIM gaps.****Proposal 3: All new GPs for MUSIM are optional.****Proposal 4: No more discussion on applicability of MUSIM GPs.****Proposal 5: RAN4 not to introduce support for multiple aperiodic gaps or multiple occasions for one aperiodic gap.** **Proposal 6: RAN4 not to introduce one additional periodic gap for MUSIM** |
| R4-2205513 | Ericsson | **Observation 1: Additional periodic gap will impact the NW A’s performance, especially when UE can finish the related processing with less trials.****Observation 2: Current 2 periodic gaps and 1 aperiodic gap for MUSIM can handle the UE’s behaviour in Idle mode for NW B.****Proposal 1: To efficient utilize the gap, UE shall inform NW with the additional assistant information when UE requests the gap for MIB/SIB1 decoding.****Proposal 2: UE can acquire the OSIs based on multiple aperiodic gaps or a periodic gap by monitoring multiple PDCCH occasions for SI message associated with the strongest SSBs.****Proposal 3: When UE requests the gap for OSI acquisition, UE shall request the gap with the assistant information, including potential M PDCCH monitoring occasions for SI message associated with the strongest M SSBs.****Proposal 4: For On-demand SI request, UE shall request one aperiodic gap(20ms) for Msgs processing when the proximity of adjacent Msgs is shorter than a threshold. Otherwise, UE shall request multiple aperiodic gaps(10ms) to handle each Msg processing.****Proposal 5: UE can request aperiodic gap with the assistant information to avoid missing the following signal reception/transmission windows. The information shall include the potential occasions to handle the subsequent Msgs’ processing.****Proposal 6: RAN4 had already agreed the following MUSIM gap patterns with MGL and MGRP in TS38.133.*** **MGL: 3ms, 4ms, 6ms, 10ms, 20ms**
* **MGRP: 20ms, 40ms, 80ms, 160ms, 320ms, 640ms, 1280ms, 2560ms, 5120**

**Proposal 7: An additional periodic gap with UE assist information or multiple aperiodic gaps requesting once a time can be believed as the optimization for MU-SIM gap and defined in next release.** |
| R4-2205514 | Ericsson | **Observation 1: Current MGPs defined in RAN4 can meet the NW B’s UE behaviour in Idle mode.****Observation 2: Aperiodic MGP with MGL 10ms is enough for SIB acquisition.****Observation 3: Aperiodic MGP with MGL 10ms can be used for on-demand SI.****Proposal 1: RAN4 not to introduce further long MGL for optimization in Rel-17 MUSIM.****Proposal 2: RAN4 to introduce the new aperiodic MGP with MGL 10ms.****Proposal 3: RAN4 to clarify the applicability that sharing the gap between network A’s mobility measurements and the MUSIM measurements is precluded.****Proposal 4: Define a separate MUSIM gap pattern table to report the supported MUSIM gap patterns by UE.****Proposal 5: UE needs to at least support MUSIM gap pattern with MGL=6MS, MGRP=1280ms once UE reporting to support MUSIM capability.** |
| R4-2205515 | Ericsson | **CR** |
| R4-2206094 | Qualcomm Incorporated | **Proposal 1: Legacy measurements gap patterns 12-23 in TS 38.133, clause 9.1.2 are applicable to MUSIM when the UE is configured in NR SA with a FR2 serving cell in network A.****Proposal 2: RAN4 should add new periodic gap patterns for MUSIM with MGL = 40 ms.****Proposal 3: The proposed LS reply to RAN2 can be found in the Appendix.** |

## Open issues summary

### Sub-topic 1-1 New gap patterns for MUSIM

**Issue 1-1-1: MGL for new periodic gap patterns for MUSIM**

* Proposals:
	+ Option 1: No need to define MGL larger than 20ms (ZTE oppo Huawei)
		- Option 1a: no need to define longer MGL at Rel-17 (Ericsson)
	+ Option 2: Add new periodic gap patterns for MUSIM with MGL = 40 ms (Qualcomm)
	+ Option 3: use the MGL value in endorsed CR R4-2202760 (vivo)
* Recommended WF
	+ Suggest to use option 1 base on majority view

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| **Company** | **Comments** |
| Ericsson | Agree with option 1 |
| OPPO | Agree with option 1. |
| Huawei | Support Recommended WF |
| Apple | Prefer option 2. Also fine with option 1. |
| ZTE | Support option 1. |
| Qualcomm | We support option 2. |
| Nokia | We think option 1/1a/3 are all fine for Rel-17.  |
| MTK | OK with Option 1 |

**Issue 1-1-2: MGRP for new periodic gap patterns for MUSIM**

* Proposals:
	+ Option 1: No need to define MGRP larger than 5120ms (ZTE)
	+ Option 2: Define gap pattern with MGL 20ms and MGRP with 5120ms (Intel Ericsson)

Moderator Note: option 1 and option 2 are not exclusive each other. Support or oppose both options are possible.

* Recommended WF
	+ Could company check whether both option 1 and option 2 are agreeable?

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| **Company** | **Comments** |
| Intel | Option 2 is the consensus since the last meeting. Option 1 is also fine for us. |
| Ericsson | Option 2.We only agree to define an additional MGP for MGRP=5210ms with MGL=20ms |
| OPPO | Both options are fine for us. |
| Huawei | Support both options. |
| Apple | Support option 2. |
| ZTE | We can support both options. |
| Qualcomm | Option 2. |
| Nokia | Both options are fine to us. |

**Issue 1-1-3: Aperiodic gap pattern for MUSIM**

* Proposals:
	+ Option 1: Introduce MGL longer than 20ms
		- [40ms 80ms] (Apple)
	+ Option 2: Do not introduce MGL longer than 20ms (ZTE oppo Huawei)
		- Option 2a: Do not introduce MGL longer than 20ms at Rel-17 (vivo, Ericsson)
	+ Option 3: Introduce MGL 10ms for aperiodic gap (Ericsson)
* Recommended WF
	+ Between option 1 and 2, suggest to use option 2 based on majority view? Could company further check whether option 3 is agreeable?

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| **Company** | **Comments** |
| Ericsson | Option 2 and option 3.We suggest to introduce aperiodic gap with MGL=10ms. It will be helpful to limit the MG length and efficient to NW A’s scheduling. |
| OPPO | Support option 2. No longer MGL is introduced in this release. For option 3, no strong view.  |
| Huawei | Support option 2 and also fine with option 3. |
| Apple | Support option 1. Mainly for RACH procedure. 20ms may not be enough. |
| ZTE | Support option 2. No strong view for option 3. |
| Qualcomm | Support option 1. |
| Nokia | We are fine with option 2, even if we see some point from option 1. Earlier all companies agreed that with MGL<=20ms there are no impacts to any requirements. But the longer gaps we introduce, the more risk there is that e.g. RLM/BFD requirements could be affected.  |
| MTK | We support Option 2. We have some concern in long MGL as mentioned by Nokia |

**Issue 1-1-4: Legacy gap pattern for MUSIM**

* Proposals:
	+ Option 1: Legacy measurements gap patterns 12-23 in TS 38.133, clause 9.1.2 are applicable to MUSIM when the UE is configured in NR SA with a FR2 serving cell in network A (Qualcomm)
* Recommended WF
	+ TBA

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| **Company** | **Comments** |
| Ericsson | Not support option 1.We agree the MGP 12-23 can be used for measurement in NR SA with FR2 serving cell, but we don’t agree to introduce more and more MUSIM patterns. From our understanding, the most useful MUSIM patterns are MGRP = 320, 640, 1280, 2560ms. All the legacy MGPs are inefficient in MUSIM case and will increase overlapping possibility with legacy L3 measurement gap in NW A which is not expected from NW A. |
| OPPO | Not clear why legacy gap patterns 12-23 should be considered for MUSIM purpose. The main difference between FR1 and FR2 gap patterns is MGL. It is agreed that MGL=[3, 4, 6, 10, 20]ms for FR1 or per-UE gaps are supported for, while MGL=[1.5, 3.5, 5.5]ms for FR2 are not included.  |
| Huawei | We do not support option 1.RAN2 has agreed that only per-UE level scheduling gap is supported in Rel-17 in RAN2#115-e.Technically, we do not see clear need for MGP 12-23 since the difference compared to MGP 0-11 is only 0.5ms MGL.  |
| Qualcomm | We would like to remind companies that the following objective was added to the MUSIM WID (RP-213679\_ in RAN#94-e:* Specify that existing gap patterns in TS 38.133 can be applicable for MUSIM and also define new gap patterns for MUSIM [RAN4]:

Therefore, we understand MG patterns can be considered, under appropriate conditions.To Huawei’s first comment about per-UE, please check the table below from 38.133.We agree that the only difference is MGL but for operation in FR2 it would be more efficient to use gaps 12-23. We understand that was the reason these gaps were introduced in the first place. If they are not useful, then why are they supported?We agree with Ericsson’s comment about inefficiency due to short MGRP of the legacy gap patterns. However, for a given MGRP of gaps 0-11, MGL could be reduced by using one of the gaps 12-23.We wanted to check if there is a good reason to exclude these MGP given the objective in the updated MUSIM WID. It may not be strictly necessary to allow using gaps 12-23 for MUSIM but we don’t agree that this would be adding new gaps. These are existing gap patterns.Table 9.1.2-3: Applicability for Gap Pattern Configurations supported by the UE with NR standalone operation (with single carrier, NR CA and NR-DC configuration)

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| Measurement gap pattern configuration | Serving cell  | Measurement Purpose NOTE 2 | Applicable Gap Pattern Id |
|  | FR1 NOTE5, orFR1 + FR2 | non-NR RAT NOTE3,6 | 0,1,2,3 |
|  |  | FR1 and/or FR2 NOTE 9 | 0-11, 24, 25 |
|  |  | non-NR RATand FR1 and/or FR2 NOTE3,6,9 | 0, 1, 2, 3, 4, 6, 7, 8,10, 24 |
| Per-UE measurement  | FR2 NOTE5 | non-NR RATonlyNOTE3,6 | 0,1,2,3 |
| gap |  | FR1 only NOTE 9 | 0-11, 24, 25 |
|  |  | FR1 and FR2 NOTE 9 | 0-11, 24, 25 |
|  |  | non-NR RATand FR1 and/or FR2 NOTE3,6,9 | 0, 1, 2, 3, 4, 6, 7, 8,10, 24 |
|  |  | FR2 only NOTE 9 | 12-23 |

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| Nokia | We support that legacy gap patterns supported by the UE can also be used for MUSIM. |
| MTK | We think Opiton 1 is fine but needs some clarification.In Legacy Rel-15, GP#12-23 can be used for NR SA only if all serving cells are in FR2. As shown from the Table in QC’s comment. With this in mind, we can follow the same rule for MUSIM gap, e.g., Legacy measurements gap patterns 12-23 in TS 38.133, clause 9.1.2 are applicable to MUSIM when the UE is configured in NR SA with only FR2 serving cell(s) in network A |
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### Sub-topic 1-2 Reply for LS R2-2201717

**Issue 1-2-1: One additional periodic gap on top of the three gaps agreement (i.e., 2 periodic gaps and 1 aperiodic gap) RAN2 keeps without sacrificing NW A performance**

* + Option 1: Do not introduce one additional periodic gap for MUSIM (Huawei)
	+ Option 2: May impact NW A performance (ZTE)
	+ Option 3: Feasible to configure 3 periodic gaps without sacrificing NW-A performance, if the overhead cap of gap combination does not exceed X%. (oppo)
	+ Option 4: Discuss additional/expanded gap configurations for MUSIM and its impact on performance at Rel-18 (Ericsson Qualcomm)
		- Option 4a: From a signaling perspective, it is up to RAN2 to introduce signaling to support configurations with more than two periodic gaps for MUSIM in Rel-17 (Qualcomm)
	+ Option 5: The scenario for 3 periodic gaps could be one periodic gap for serving cell measurement, one periodic for neighbour cell measurement and the other periodic gap for paging reception. Whether extra sacrificing on NW A compared with 2 periodic gap method needs more investigation. (vivo)
* Recommended WF
	+ TBA

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| **Company** | **Comments** |
| Intel | Do not introduce any additional number of periodic or aperiodic gap the UE may support. We don’t see justification to revisit the basic assumptions we have been had for UE gaps. |
| Ericsson | We agree option 1,2,4.We think it’s better to discuss more MUSIM gap patterns(periodic and multiple aperiodic MGPs) with the UE behaviour in next release.We also agree that how to define the signalling is purely RAN2’s issue. |
| OPPO | Considering the longer MGRP introduced for MUSIM, we think 3 periodic gaps are possible without sacrificing NW-A performance. For example, if 3 gaps with MGL=6ms and MGRP=2560ms are used, the overall interruption 6\*3/2560=0.7% is less than that of legacy single gap configuration, e.g. 6/180=3.3%. Therefore, we think 3 periodic gaps are possible with additional restrictions such as overhead cap discussed in MG-enh WID. |
| Huawei | Support option 1 and 2. We think the current framework is already sufficient for most of the configurations and there is no need to optimize for all possible configurations. Introducing additional periodic gap, even without additional overhead at NW A, will complicate UE and NW implementation. |
| ZTE | Support option 1 and option 2. The current configuration is sufficient for typical scenarios. If one additional periodic gap is added, the complexity of scheduling in NW A may increase..  |
| Qualcomm | We support option 4. There is no scope in RAN4 to discuss expanded gap configurations for MUSIM in Rel-17. It can be discussed in the next release. The signalling aspect is left up to RAN2. |
| Nokia | Option 4.RAN2 asked about the feasibility of option 3, and we have some sympathy for that, but RAN4 really doesn't have the time to do the feasibility study in Rel-17. We can discuss the impact further in Rel-18. |
| MTK | Option 1.We understand the intention of a 3rd periodic gap, but 2 periodic gaps can still work by reducing the periodicity of the gap. In our understanding, the SMTC are typically aligned among multiple NR carriers. Therefore, total 2 periodic gap sounds sufficient. E.g., the gap to cover both intra-freq and inter-freq measurements. The 3rd gap is more like an optimization for non-typical deployments. |

**Issue 1-2-2: Draft reply LS**

**For information only: Draft reply LSs are available at: R4-2204307; R4-2205513; R4-2206094; R4-2204318**

### Sub-topic 1-3 Application issue for MUSIM

**Issue 1-3-1: Application considerations**

* Proposals
	+ Option 1: Applicability of MUSIM GPs are already specified in the endorsed CR, no more discussion (Huawei)
		- Option 1a: RAN4 to clarify the applicability that sharing the gap between network A’s mobility measurements and the MUSIM measurements is precluded. (Ericsson)
		- Option 1b: UE will require MUSIM gaps for MUSIM purpose. After NW allows UE’s request on MUSIM gap for MUSIM measurement, further constraints are not needed since the purpose is clear (vivo)
* Recommended WF: Suggest to agree option 1 and directly work on corresponding CR, if necessary

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| **Company** | **Comments** |
| Intel | Option 1. We will not discuss any requirement to be implemented in the spec in Rel-17. |
| Ericsson | Option 1 and 1aOur proposal 1a is not relevant to MUSIM GPs’ applicability. It’s about the impact to legacy measurement behaviour. We don’t expect any impact to legacy L3/L1 measurement in Rel-17 since RP agrees not to discuss any requirement for MUSIM in Rel-17. |
| OPPO | Support option 1. |
| Huawei | Option 1.On option 1a, based on endorsed CR last meeting, MUSIM gaps are only used for MUSIM purposes, so it cannot be shared for RRM measurement for NW A based on the applicability.  |
| Apple | Support option 1. |
| ZTE | Support option 1. |
| Qualcomm | We support option 1. The applicability of MUSIM gaps is clear in the endorsed CR.“The MUSIM gap patterns specified in Table 9.1.2X-1 are applicable only for MUSIM operation.” |
| Nokia | Option 1. Our view is that MUSIM gaps shall not impact the RRM measurements in network A. |
| MTK | Option 1.We think the current spec is sufficiently clear. |

**Issue 1-3-2: MIB/SIB1 acquisition**

* Proposals
	+ Option 1: Option 1: Do not introduce support for multiple aperiodic gaps or multiple occasions for one aperiodic gap (Huawei)
	+ Option 2: To efficient utilize the gap, UE shall inform NW with the additional assistant information when UE requests the gap for MIB/SIB1 decoding (Ericsson)
* Recommended WF
	+ TBA

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| **Company** | **Comments** |
| Intel | We support Option 1. Option 2 seems not RAN4 work. |
| Ericsson | Option 2.This issue is about the reply LS to RAN2 other than RAN4 new MUSIM gap’s discussion. In reply LS R4-2120342, it captured the feedback about MIB/SIB1 reading as follow. To efficient the gap, UE shall inform NW the assistant information to help NW A to release the gap.

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| * Scenario 2: SI receiving at network B,
	+ Regarding scenario 2, RAN4 concludes that an aperiodic gap pattern can fulfill the task of MIB/SIB1 reading. In addition, legacy gap patterns can fulfill this task but RAN4 has not studied how efficient it would be. A UE may require multiple attempts to read MIB/SIB1when using an aperiodic gap. For efficiency purpose, a legacy gap pattern configured for MIB/SIB1 reading can be released after successfully decoding SIB1 information.
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| Huawei | Option 1.On option 2, we understand the issue has been discussed in RAN2, and the agreement in RAN2#116-e was to not introduce gap purpose for gap related MUSIM assistance information. |
| ZTE | Option 1. |
| Qualcomm | We don’t think these issue fall within RAN4 scope. RAN2 has already decided not to support option1. |
| Nokia | RAN2 already agreed to support a single aperiodic gap, with the following agreements:RAN2#115e:5 The network is allowed to configure at most 3 gap patterns (for any MUSIM purpose). 6 Only a single aperiodic gap (for MUSIM) is supported in Rel-17. At most two periodic “gaps” (for MUSIM) and a single aperiodic gap (for MUSIM) is supported in Rel-17. FFS if signalling supports more.RAN2#116bis-e:* 3: keep three gaps agreement (i.e., 2 periodic gaps and 1 aperiodic gap) for now. Ask to RAN4 to clarify if one additional periodic gap can be possible without sacrificing NW A performance (exact LS wording for the question can be discussed offline).

So the only thing RAN2 has asked is whether 3 periodic gaps could be supported.  |
| MTK | Option 1. It is not clear whether Option 2 is meaning that UE will ask for a 2nd aperiodic gap simultaneously with the 1st gap or sequentially after the 1st aperiodic gap. The later one should already be allowed now. |

**Issue 1-3-3: OSI acquisition**

* Proposals
	+ Option 1: Do not introduce support for multiple aperiodic gaps or multiple occasions for one aperiodic gap (Huawei)
	+ Option 2: UE can use multiple aperiodic gaps or a periodic gap by monitoring multiple PDCCH occasions for SI message associated with the strongest SSBs; UE shall request the gap with the assistant information, including potential M PDCCH monitoring occasions for SI message associated with the strongest M SSBs (Ericsson)
	+ Option 3: How a UE requests MUSIM gap for MUSIM measurement including OSI acquisition and On-demand SI acquisition is up to UE implementation issue and no further enhancements/optimizations at Rel-17 time scale (vivo)
* Recommended WF
	+ TBA

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| **Company** | **Comments** |
| Intel | We support option 1 and option 3. Option 2 seems not RAN4 work. |
| Ericsson | Option 2.This issue is about the reply LS to RAN2 other than RAN4 new MUSIM gap’s discussion.In RAN2’s LS R2-2108861, it asked RAN4 about the OSI acquisition behaviour. In RAN4 reply LS R4-2120342, there is no feedback about this UE behaviour.After UE detecting the N SSBs(N is the number of actual transmitted SSBs determined according to *ssb-PositionsInBurst* in *SIB1*), the UE will at most had to monitor the N PDCCH occasions for SI message acquisition. More important, the UE may only need to monitor M PDCCH occasions which associates with the strongest M SSBs will be enough to guarantee the SI decoding performance. Therefore, to avoid the performance degradation for NW A, additional assistant information shall be reported by UE. UE can request aperiodic gap with the potential PDCCH monitoring occasions for SI message associated to the strongest M SSBs. |
| Huawei | Option 1 and 3.On option 2, same comment as for Issue 1-3-2, and agree with Intel that this is not RAN4 work. |
| ZTE | Support option 1 and option 3. |
| Qualcomm | For option 1, same view as for issue 1-3-2.Support option 3.  |
| Nokia | Option 1/3 (both are according to current RAN2 agreements)We support the notion of multiple aperiodic gaps used by the UE, but currently we do not see a need for having multiple simultaneous aperiodic gaps active simultaneously. RAN2 agreements only allow a single aperiodic gap at a time. |
| MTK | Support Option 1 and 3.Same comment as the previous issue to Option 2. (sequentially or in parallel?) |
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**Issue 1-3-4: On-demand SI**

* Proposals
	+ Option 1: Do not introduce support for multiple aperiodic gaps or multiple occasions for one aperiodic gap (Huawei)
	+ Option 2: It’s feasible to use multiple short aperiodic gaps for Msg1, Msg2, (Msg3, Msg4) transmission/reception or their combinations and multiple trials for On-demand SI request. (Apple)
		- Option 2a: For On-demand SI request, UE shall request one aperiodic gap(20ms) for Msgs processing when the proximity of adjacent Msgs is shorter than a threshold. Otherwise, UE shall request multiple aperiodic gaps(10ms) to handle each Msg processing. UE can request aperiodic gap with the assistant information to avoid missing the following signal reception/transmission windows. The information shall include the potential occasions to handle the subsequent Msgs’ processing. (Ericsson)
	+ Option 3: How a UE requests MUSIM gap for MUSIM measurement including OSI acquisition and On-demand SI acquisition is up to UE implementation issue and no further enhancements/optimizations at Rel-17 time scale (vivo)
* Recommended WF
	+ TBA

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| **Company** | **Comments** |
| Ericsson | Option 2a.In RAN2’s LS R2-2108861, it asked RAN4 about the On-demand SI behaviour. In RAN4 reply LS R4-2120342, there is no consensus about this in RAN4.

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| * Scenario 3: Aperiodic (one-shot) switching with both transmission and reception at network B but will not enter RRC-connected state in NW B (e.g. no RRC connection Resume/Setup) at network B, including On-demand SI request;
	+ Regarding scenario 3, RAN4 has not reached conclusions
 |

To avoid the long interruption due to single gap, multiple short aperiodic gaps for Msg1, Msg2, (Msg3, Msg4) transmission/reception or the combination of Msgs is preferred.UE may request one gap per RA Msg, such as Msg 1 and Msg 3 with 10ms aperiodic gap and Msg 2 with 10ms and Msg 4 with 20ms. To efficient manage the gaps for RACH, UE can also request one aperiodic gap to handle several Msgs combination if possible.To avoid missing the following Msgs by aperiodic gap, it’s preferred that the UE can request aperiodic gap with the assistant information to avoid missing the following signal reception/transmission windows. |
| Huawei | Option 1 and 3.On option 2, same comment as for Issue 1-3-3. |
| Apple | Support option 2 unless RAN4 agrees on longer MGL for aperiodic gap, e.g. 40ms. Our concern is 20ms may not be enough for RACH procedure. One may argue that UE can request aperiodic gap multiple. However, efficiency would be quite low and it will also introduce extra negative impact on NW A, since there will be a couple of extra RRC procedures. |
| ZTE | Support option 1 and option 3. |
| Qualcomm | We understand option 2 is outside of RAN4 scope and not supported by RAN2.Support option 3. |
| Nokia | Option 1/3 (both are according to current RAN2 agreements) |
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**Issue 1-3-5: Multiple aperiodic gaps**

* Proposals
	+ Option 1: Do not introduce support for multiple aperiodic gaps or multiple occasions for one aperiodic gap (Huawei)
	+ Option 2: Multiple aperiodic gaps requesting once a time can be believed as the optimization for MU-SIM gap and defined in next release. (Ericsson)
* Recommended WF
	+ TBA

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| **Company** | **Comments** |
| Ericsson | Option 2.Multiple aperiodic gaps or multiple occasions for one aperiodic gap will be useful for OSI acquisition and On-demand SI, but we also noticed the time pressure to further discuss it in Rel-17. Thus, we’re fine to discuss it in next release. |
| Huawei | Option 1. |
| Apple | Support requesting multiple aperiodic gaps once a time for efficiency. |
| Qualcomm | We understand that configuring multiple aperiodic gaps is not supported by RAN2 in Rel-17 MUSIM. |
| Nokia | Option 2. Discussion can be postponed to Rel-18. Current RAN2 agreements only consider single aperiodic gap. |
| MTK | At least we can agree on no such a work in Rel-17. |
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### Sub-topic 1-4 UE feature issue

**Issue 1-4-1: Mandatory new gap pattern for MUSIM**

* Proposals:
	+ Option 1: UE needs to at least support MUSIM gap pattern with MGL=6MS, MGRP=1280ms once UE reporting to support MUSIM capability. (Ericsson)
	+ Option 2: Not necessary to introduce mandatory MGPs for MUSIM (Apple oppo Huawei)
* Recommended WF
	+ TBA

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| **Company** | **Comments** |
| Intel | We slightly prefer Option 2.Let’s maybe have discussion on the benefit brought by mandating any of the pattern. Our view is that the UE is not indicating any supported pattern in capability signalling and the UE can request any pattern in the table. The network has liberty to configure any pattern so we don’t see the obvious need to mandate any pattern and to make these patterns different from others. |
| Ericsson | Option 1.Mandatory gap patterns are not only for UE but also the guideline for NW. If no mandatory MUSIM gap pattern will be introduced, different UEs may implement different MUSIM GPs which implies NW may implement all these MUSIM GPs. Otherwise, when UE requests MUSIM GP A, NW may only configure the MUSIM GP B. In other words, either UE implements the same MUSIM GP suggested by NW or no MUSIM GP will be configured. This feature will be useless if no any mandatory MUSIM GP will be defined. |
| OPPO | Prefer option 2. MUSIM gaps are more dependent on UE request rather than NW configuration.  |
| Huawei | Option 1.As a compromise, we are fine to define MUSIM gap pattern 0 and 1 as mandatory because they are same as legacy MGP 0 and 1. |
| Apple | Support option 2. Our takeaway message from infra vendor is they probably only implement mandatory patterns for MUSIM. Our concern on that this may preclude UE from using legacy gap for MUSIM. |
| ZTE | Support option 2.  |
| Qualcomm | Option 2.To Huawei: Did you mean to say you support option 2 instead of option 1? |
| Nokia | We support option 1. Since all UEs will support 6ms gaps for measurements, it's natural that they also support 6ms gap for MUSIM purposes. As for MGRP, 1280 is one typical value for paging reception, so all UEs should support at least that. |
| MTK | Option 2.MUSIM gaps are requested by UE to fit the network B operations. It is eventually up to UE’s choice on how to use the gap(s) to facilitate paging and measurements. In this sense, it is very strange to mandate some of the gap patterns |

**Issue 1-4-2 UE capability for MUSIM**

* + Option 1: Define a separate MUSIM gap pattern table to report the supported MUSIM gap patterns by UE(Ericsson vivo)
		- Option 1a: Detailed design on signalling is up to RAN2 decision (vivo)
* Recommended WF: Suggest to agree option 1.

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Intel | This is RAN2 discussion. |
| Ericsson | Option 1.From our understanding, RAN4 should agree the UE’s capability table and send LS to RAN2 to ask them to implement it. |
| OPPO | Up to RAN2. |
| Huawei | Option 1, we have no strong view whether this capability should be defined by RAN4 or RAN2.  |
| Apple | Option 1 is straightforward for us. no strong view on doing it in RAN2 or RAN4. |
| ZTE | Option 1. |
| Qualcomm | Option 1. |
| Nokia | Our opinion would be that any GP supported by the UE can also be used for MUSIM. If new GPs are defined for MUSM they should be captured in own table. |
| MTK | We do not see the intention to report the supported gap pattern as a UE capability. In our view, network A should just follow UE’s recommendation to configure the MUSIM gap, because network A has no idea about the SMTC/paging setting in network B. And the UE of course will only recommend the MUSIM gap that it can support. In this sense, why should network A care which else gap patterns are supported by UE? |

## Companies views’ collection for 1st round

### Open issues

*One of the two formats, i.e. either example 1 or 2 can be used by moderators.*

### CRs/TPs comments collection

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

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| **R4-2204422** | Huawei: OK |
| Qualcomm: We prefer the section numbering in the endorsed CR R4-2202760. MUSIM gaps should be added in a new section parallel to 9.1.2 Measurement gap. That way it would be clearer that MUSIM gaps are not traditional measurement gaps; they are used for a different purpose. Removing brackets is OK once there is an agreement. |
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| **R4-2205515** | We do not agree with some of the contents in the CR. Please see our comments in the open issues. Our suggestion is to endorse R4-2204422 first and discuss other changes in the CR. |
| Huawei: We do not agree with the following change in the CR, as MUSIM gaps may impact RRM measurement at NW A.The measurement delay requirement defined in section 9.2, 9.3, 9.4, 9.5 for NW A is not expected to be extended when UE requires MUSIM gap patterns for MUSIM purpose. Other changes are fine. |
| Qualcomm: The highlighted statement below is not quite accurate and should be removed. It it clear from applicability of MUSIM gaps that they are used for MUSIM purposes. RRM measurements in network A are not for MUSIM purposes.The measurement delay requirement defined in section 9.2, 9.3, 9.4, 9.5 for NW A is not expected to be extended when UE requires MUSIM gap patterns for MUSIM purpose. Changes to the table of supported MUSIM gap patterns need to be agreed first. |
| MTK: We have a major concern to the sentenceThe measurement delay requirement defined in section 9.2, 9.3, 9.4, 9.5 for NW A is not expected to be extended when UE requires MUSIM gap patterns for MUSIM purpose. It is possible tha the MUSIM gap could collide with some of the legacy gaps. And some impact to the UE performance is expected. However, according to Plenary guidance, RAN4 should leave this no requirement. With this sentence, the requirements are already concluded actually, which seems not right. Regarding the new aperiodic gap pattern, it is pending on the conclusion of **Issue 1-1-3.** |
|  |
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## 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 #1-1** |  |

|  |  |
| --- | --- |
|  | **Status summary**  |
| **Sub-topic #1-2** |  |

|  |  |
| --- | --- |
|  | **Status summary**  |
| **Sub-topic #1-3** |  |

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| --- | --- |
|  | **Status summary**  |
| **Sub-topic #1-4** |  |

### CRs/TPs

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

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

|  |  |
| --- | --- |
| **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)

# Recommendations for Tdocs

## 1st round

**New tdocs**

|  |  |  |
| --- | --- | --- |
| **Title** | **Source** | **Comments** |
|  |  |  |
|  |  |  |
|  |  |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation**  | **Comments** |
| [**R4-2203748**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203748.zip) | On R17 MUSIM | Apple |  |  |
| [**R4-2204161**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204161.zip) | Discussion on MUSIM requirements | ZTE Corporation |  |  |
| [**R4-2204307**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204307.zip) | Discussion on RRM core requirements for Multi-SIM devices | OPPO |  |  |
| [**R4-2204318**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204318.zip) | On remaining issues for Rel-17 MUSIM requirements | vivo |  |  |
| [**R4-2204422**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204422.zip) | Removing square brackets for MUSIM gap patterns | Intel Corporation |  |  |
| [**R4-2205394**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205394.zip) | Discussion on remaining issues for MUSIM | Huawei, HiSilicon |  |  |
| [**R4-2205513**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205513.zip) | LS response on gap handling for MUSIM | Ericsson |  |  |
| [**R4-2205514**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205514.zip) | New gap pattern for MUSIM | Ericsson |  |  |
| [**R4-2205515**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205515.zip) | draftCR on New gap pattern for MUSIM | Ericsson |  |  |
| [**R4-2206094**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2206094.zip) | Second reply LS on gaps for MUSIM | Qualcomm Incorporated |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics incl. existing and new tdocs.
2. For the Recommendation column please include one of the following:
	1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
	2. Other documents: Agreeable, Revised, Noted
3. For new LS documents, please include information on To/Cc WGs in the comments column
4. Do not include hyper-links in the documents

## 2nd round

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

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics.
2. For the Recommendation column please include one of the following:
	1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
	2. Other documents: Agreeable, Revised, Noted
3. Do not include hyper-links in the documents

# Annex

Contact information

|  |  |  |
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Note:

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