**3GPP TSG-RAN WG2 Meeting #118-e R2-2206171**

**Electronic, 09 – 20 May 2022**

**Agenda item: 6.3.3**

**Source: Qualcomm Incorporated**

**Title: [AT118-e][232][** **MUSIM] Corrections to MUSIM gap configuration aspects**

**Document for: Discussion and decision**

# Introduction

This document will capture the open issues and corrections for Rel-17 MUSIM gap configurations per the email discussion below:

**[AT118-e][232][MUSIM] Corrections to MUSIM gap configuration aspects (Qualcomm)**

      Scope: Discuss corrections for MUSIM gap configurations to determine which are agreaable. Should focus on essential corrections.

 Intended outcome: Discussion report in R2-2206171.

 Deadline: Deadline 4

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# Discussion

The following papers were submitted to RAN2#118-e for the Rel-17 MUSIM gap corrections:

*Duration of MUSIM gaps:*

R[2-2205964](file:///E%3A%5C3GPP%E6%96%87%E6%A1%A3%5C%E4%BC%9A%E8%AE%AE%E6%96%87%E7%A8%BF%5C2022%5CRAN2%20118%5CR2-2205964.zip) Configuration of MUSIM Gaps Qualcomm Incorporated discussion

**Only P2 and P3 discussed (P1 has been concluded earlier)**

*Gap priority and alignment with other gap types:*

R[2-2204896](file:///E%3A%5C3GPP%E6%96%87%E6%A1%A3%5C%E4%BC%9A%E8%AE%AE%E6%96%87%E7%A8%BF%5C2022%5CRAN2%20118%5CR2-2204896.zip) Discussion on MUSIM gap priority vivo discussion Rel-17 LTE\_NR\_MUSIM-Core

R[2-2205755](file:///E%3A%5C3GPP%E6%96%87%E6%A1%A3%5C%E4%BC%9A%E8%AE%AE%E6%96%87%E7%A8%BF%5C2022%5CRAN2%20118%5CR2-2205755.zip) Mandatory values for Multi-USIM gap patterns Ericsson discussion

R2-2205758 Alignment between RAN2 and RAN4 Multi-USIM gap Ericsson discussion

R2-2205759 IE harmonization for MUSIM UAI and gap configuration Ericsson discussion

R2-2204618 On remaining issues for UAI related to MUSIM Nokia, Nokia Shanghai Bells discussion

*MUSIM gap configuration:*

R2-2204614 Alternative ASN.1 for MUSIM Gap Configuration Nokia, Nokia Shanghai Bells discussion Rel-17

R[2-2204615](file:///E%3A%5C3GPP%E6%96%87%E6%A1%A3%5C%E4%BC%9A%E8%AE%AE%E6%96%87%E7%A8%BF%5C2022%5CRAN2%20118%5CR2-2204615.zip) Alignment of text for MUSIM gap configuration Nokia, Nokia Shanghai Bells discussion Rel-17

R2-2204895 Discussion on handling of MUSIM gaps vivo discussion Rel-17 LTE\_NR\_MUSIM-Core

R[2-2205322](file:///E%3A%5C3GPP%E6%96%87%E6%A1%A3%5C%E4%BC%9A%E8%AE%AE%E6%96%87%E7%A8%BF%5C2022%5CRAN2%20118%5CR2-2205322.zip) Further consideration on the MUSIM gaps ZTE Corporation, Sanechips discussion Rel-17 LTE\_NR\_MUSIM-Core

R2-2205197 Corrections to NW switching procedure without leaving RRC\_CONNECTED Huawei, HiSilicon discussion Rel-17

*MAC behaviour during MUSIM gaps:*

R2-2205042 Clarification on MAC behaviour during MUSIM gaps NEC CR Rel-17 38.321 17.0.0 1248 - F LTE\_NR\_MUSIM-Core

R[2-2205120](file:///E%3A%5C3GPP%E6%96%87%E6%A1%A3%5C%E4%BC%9A%E8%AE%AE%E6%96%87%E7%A8%BF%5C2022%5CRAN2%20118%5CR2-2205120.zip) Stop using of MUSIM Gap requested to be released Sharp discussion

## A. Duration of MUSIM gaps

In R[2-2205964](file:///E%3A%5C3GPP%E6%96%87%E6%A1%A3%5C%E4%BC%9A%E8%AE%AE%E6%96%87%E7%A8%BF%5C2022%5CRAN2%20118%5CR2-2205964.zip), it is argued that the existing number and durations of gaps are not sufficient for Idle/Inactive mode activites on the other USIM.

The Chair Notes has the following guideline on this:

R2-2205964 Configuration of MUSIM Gaps Qualcomm Incorporated discussion

1. Only P2 and P3 discussed (P1 can be discussed online with RAN4 LS R[2-2204481](file:///E%3A%5C3GPP%E6%96%87%E6%A1%A3%5C%E4%BC%9A%E8%AE%AE%E6%96%87%E7%A8%BF%5C2022%5CRAN2%20118%5CR2-2204481.zip))

P2 here is for extending the gap duration to 30ms. The contribution assumes that one periodic gap pattern is used for inter-frequency measurements and the remaining gap will need to be used for paging reception. However, if SSB and PO are far apart, then a duration of 20ms will not be sufficient to measure SSB and then receive paging. If RAN2 agrees to support more than two periodic gap patterns, this proposal may not be needed.

**Question A1: Do you support extending the MUSIM gap duration beyond 20ms if RAN2 keeps the current limit of two for periodic gap patterns?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Response** | **Comments** |
| vivo | No | RAN4 has sent the Reply LS on RAN2’s agreement for MUSIM gaps(R2-2204481), in which RAN4 specifies the periodic and aperiodic gap patterns with a max. duration of 20ms, and concludes that RAN4 will not take any work on Q3 of [R2-2201717] within Rel-17 time frame. Hence, it may be liitle late to extend the MUSIM gap duration beyond 20ms. Maybe RAN2 could discuss whether to introduce signalling to support configurations with more than two periodic gaps for MUSIM in Rel-17 or not. |
| Huawei/HiSilicon | No | Not needed with current agreement “Extend signalling to allow UEs to optionally support 3 periodic gaps in Rel-17” |
| NEC | No | Agree with HW. |
| Nokia | No | With latest agreement for 3 periodic gaps this is not required any more. |
| Ericsson | No | Same view as HW.s |
| Samsung | No | Agree with HW. |
| Apple | No | Instead of extending the gap duration, the latest agreement reached in the last online session with regards to having the optional support for 3 periodic gaps should address this case. Agree with HW reasoning on this. |
| MediaTek | No | We have some symphay that 20ms may not be enough for aperiodic gap. However, since the WI is closed and RAN4 has discussed this. We suggest not to do further optimization. |
| Intel | No | There is potential RAN4 impact and the proposal is not essential given the agreement to support optionally 3 gaps. |
| ZTE | No | Agree with Nokia and Huawei |
| LGE | No |  |
| Sharp | No | No more needed with current agreement as Huawei said. |
| DENSO | No | Agree with Huaewei |

**Summary:**

**Proposal:**

P3 in the paper is to clarify UE behavior for RLM and BFD during MUSIM gaps. For legacy gaps, RAN4 specification 38.133 Section 8.1.2 and 8.1.3 allow some relaxation when gaps are overlapping with SSB or CSI-RS. Then the question is whether the same can be applied to MUSIM or not, which can be up to RAN4 and will likely have to wait for Rel-18. Alternavively, RAN2 can make the decision in Rel-17. Thus, there can be two options:

1. Option 1: The UE suspends RLM/BFD and any associated recovery procedures during MUSIM gaps
2. Option 2: Leave the decision to RAN4 and wait for Rel-18

**Question A2: Which option do you prefer for RLM and BFD during MUSIM gaps? A different option can be suggested.**

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| --- | --- | --- |
| **Company** | **Response** | **Comments** |
| OPPO | Option2 | We believe this is already in the scope of R18 MUSIM. |
| vivo | Option2 | Already in the scope of Rel-18 MUSIM WI[RP-220955]

|  |
| --- |
| 2. Define RRM requirements for Rel-17 MUSIM gaps [RAN4, RAN2]* Define RRM requirements for Rel-17 MUSIM gaps [RAN4, RAN2]
	+ The following MUSIM gap requirements are considered
		- Measurements in Network A
		- Measurements in Network B in RRC idle/inactive
		- Note: it is up to RAN4 decision whether to define requirements for Network B.
	+ Identify and specify, if needed, solutions for MUSIM gap collision handling for the following cases [RAN4, RAN2]
		- Case 1: Collisions between MUSIM gap and legacy measurement gap (i.e., Rel-15 to Rel-17 measurement gaps)
		- Case 2: Collisions between MUSIM gap and SMTC
		- Case 3: Collisions between different MUSIM gaps
		- Note: RAN2 work can be triggered by RAN4 LS only if needed
	+ Identify impacts on L1 measurements, RLM/BFD and L3 measurements and specify corresponding UE requirements, if necessary, when MUSIM gap(s) are configured, for the following scenarios [RAN4]
		- Only MUSIM gap(s) are configured
		- MUSIM gap(s) and legacy measurement gap are configured

Note: requirements are applicable to MUSIM gaps defined in Rel-17 MUSIM WI (LTE\_NR\_MUSIM) |

 |
| Huawei/HiSilicon | Option 2 | It should be up to RAN4 to discuss and can wait for Rel-18 |
| NEC | Option 2 | Agree with companies above. |
| Nokia | Option 2 | UE behaviour related to any tasks during gap is left to UE implementation. No specification changes needed. It will be upto UE to handle this scenario. |
| Ericsson | Option 2 |  |
| Samsung | Option 2 |  |
| Apple | Option 2 | Option 2 seems to be the most practical one given the current timelines. This is already in R18 WI for RAN4/RAN2. |
| MediaTek | Option 2 |  |
| Intel | Option 2 |  |
| ZTE | Option 2 | Option 2 is more practical |
| LGE | Option 2 |  |
| Sharp | Oprion 2 |  |
| DENSO | Oprion 2 |  |

**Summary:**

**Proposal:**

## B. Gap priority and alignment with other gap types

R[2-2204618](file:///E%3A%5C3GPP%E6%96%87%E6%A1%A3%5C%E4%BC%9A%E8%AE%AE%E6%96%87%E7%A8%BF%5C2022%5CRAN2%20118%5CR2-2204618.zip) proposes that the UE signals a “gap priority” in UAI for MUSIM gap preference. The justification is that the activities performed on the other USIM during the gap may have different levels of importance and latency sensitivity, e.g. paging reception is more critical than measurements. The TP for ASN.1 is shown in the paper where the new IE would be as follows:

“Musim-GapPriority ENUM(high) -- OPTIONAL”

There were related discussions in RAN2 on this topic previously where signaling of a “gap cause” was discussed but this was not adopted.

In R[2-2204896](file:///E%3A%5C3GPP%E6%96%87%E6%A1%A3%5C%E4%BC%9A%E8%AE%AE%E6%96%87%E7%A8%BF%5C2022%5CRAN2%20118%5CR2-2204896.zip), Rel-17/18 MUSIM WI rapporteur suggests to postpone any discussion on gap priority to Rel-18 WI. However, the priority in this paper is in regards to the collision between different types of gaps which is being discussed in RAN4.

**Question B1: Do you support introducing a “gap priority” in UAI as proposed in R**[**2-2204618**](file:///E%3A%5C3GPP%E6%96%87%E6%A1%A3%5C%E4%BC%9A%E8%AE%AE%E6%96%87%E7%A8%BF%5C2022%5CRAN2%20118%5CR2-2204618.zip)**?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Response** | **Comments** |
| OPPO | Not in R17 | We believe RAN4 will discuss this issue in R18 MUSIM. |
| vivo | Not in R17 | gap priority could be addressed in Rel-18 MUSIM WI  |
| Huawei/HiSilicon | No | RAN4 discussed the handling of collision between concurrent measurement gaps and recommended priority levels as part of NR\_MG\_enh WI. But they will discuss MUSIM gap priority levels as part of Rel-18 MUSIM WI. In the current spec, the gap priority is configured by NW and how to set the priority for MUSIM gap in Rel-17 is up to NW implementation. We don’t see the necessity for UE to report the MUSIM gap priority in UAI. |
| NEC | No | We think in this release, up to network implementation to configure the gap priority is sufficient. |
| Nokia | Yes | Awareness of the priority of gap preference is needed for the NW to decide on the gap configuration if it wants to configure only one of the gaps. If the gap for paging monitoring is not configured, there will be static blind retuning from UE side on these gaps if UE decides to use gap even not configured. If UE attempts to change paging occasion via collision reporting, this may require connection setup in other network for which UE needs to release the connection in NTWK-A. Either of the above is not preferred system behaviour. Moreover, the common discussion related to all gaps already consider priority among different types of gaps if they are configured. So this will be an extension for the same. The specification impact is very minimum and limited to ASN.1 changes. NW behaviour for this field is not required to be specified. Implicit gap priority in terms of the position within gap preference also can be considered without signalling changes if ASN.1 changes to be avoided. |
| Ericsson | No | Considering that in Rel.18 one of the items is to identify and specify solutions for MUSIM gap collision handling, the introduction of the priority can be discussed there.  |
| Samsung | No |  |
| Apple | No | Maybe for R18 but not for R17. |
| MediaTek | No | Don’t really understand how UE set the gap priority in UAI and how NW treat the gap priority. It request more discussion and we should close the WI. |
| Intel | No | Defer to Rel-18. |
| ZTE | FFS | The priority in the reconfiguration was also discussed in the offline [027], we can wait for the discussion result from the [027], if it was introduced, then we can further discuss whether it was also needed in the UAI |
| LGE | Yes | We think that the gap priority is obviously helpful when the network cannot configure all the gap requested from the UE.In particular, since some UEs will be likely to use a voice call in NW B only, if NW A does not configure the important gap to the UE, the quality of service may be decreased. |
| Sharp | No | Gap priority will be handled in Rel-18 as said by other companies. |
| DENSO | No | Gap priority would be discussed in Rel.18 as other companies said. |

**Summary:**

**Proposal:**

R2-2204618 proposes to “to support UE behaviour to retry sending the UAI not configured in response to earlier UAI transmission”. This considers the scenario where the NW has not configured the UE according to the earlier request. Then the UE should have the option to indicate the same preference. However, in the current specification, the UE is only allowed to send a gap preference if it is different than the previous one. The TP for the RRC procedure is shown in the contribution.

**Question B2: Do you support UE behavior to retry sending the UAI not configured in response to earlier UAI transmission as proposed in R2-2204618?**

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| --- | --- | --- |
| **Company** | **Response** | **Comments** |
| OPPO | No strong view |  |
| vivo | No | If the UE has sent the gap preference to the network but not received the response from NW, which means the network rejected the UE’s request. If the UE still maintains this gap preference (if the UE does not has such preference any more, the UE shall update its preference), the network also knows it and configures the gap if it can.However, if UE retry sending the same earlier UAI, it may bring unnecessy signalling overload. |
| Huawei/HiSilicon | No | We do not see any special reason for “UAI with MUSIM assistance information” to be not aligned with “UAI with other assistance information”. |
| NEC | NO | The network is fully aware that the UE still have the same gap preference, although doesn’t configure the UE with the gap. There is no reason to resend at all. |
| Nokia | Yes | NW not configuring given gap may be temporary situation. So UE should attempt for the same gap after prohibit timer to ensure coordinated MUSIM operation. |
| Ericsson | No | This could increase the signalling load, since the UE continuously sends UAI messages, we already introduced the prohibit timer to avoid that. |
| Samsung | No |  |
| Apple | No | This might work contrary to the prohibit timer.  |
| MediaTek | No | If UE change the preference, it can send update to NW (after probhit timer). Resending same content is not useful. |
| Intel | No | There is no reason in our understanding for UE to retry something. Network has already received the first request and is aware of the UE requirement.  |
| ZTE | No |  |
| LGE | No | If the UE's request is not accepted, it means that the network does not want to do it, so retransmission same request will not have much gain. |
| Sharp | No | We can rely on NW implementation. NW can configure the requested gap when it can support the gap if the requested gap cannot configured at the time of receiving the UAI message. |
| DENSO | No | Maybe UE can retry sending UAI after prohibit timer is expired, however, no need to modify current specification. |

**Summary:**

**Proposal:**

R2-2204618 also proposes that the UE does not need to stop prohibit timer if the NW disables MUSIM assistance for gap preference. The suggested change is as follows:

1> if the received *otherConfig* includes the *musim-GapAssistanceConfig*:

2> if *musim-GapAssistanceConfig* is set to *setup*:

3> consider itself to be configured to provide MUSIM assistance information without leaving RRC\_CONNECTED in accordance with 5.7.4;

2> else:

3> consider itself not to be configured to provide MUSIM assistance information without leaving RRC\_CONNECTED in accordance with 5.7.4;

The rapporteur thinks that this does not change the observable UE behavior since the UE will not send a request when the configuration is released. The existing text is also aligned with other legacy UAI procedures.

**Question B3: Do you support the change for T346h as proposed above?**

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| --- | --- | --- |
| **Company** | **Response** | **Comments** |
| OPPO | Support | We are fine to align with other legacy UAI procedures. |
| vivo | No | In other legacy UAI procedures, some prohibit timers are also stopped when the network releases the configuration. E.g. T345,T346a ,T346g, T346i, T346f. In RAN2#117e, we have agreed that “If NW releases musim-LeaveAssistanceConfig, UE stops the timer (even if running) (i.e. if UE leaves NW A, it is as per UE implementation-specific operation that is not specified in 3GPP).”, similar handling is adopted for *musim-GapAssistanceConfig* in TS38.331-h00. |
| Huawei/HiSilicon | No | Agree with rapporteur |
| NEC | No | Agree with rapporteur |
| Nokia | Yes |  |
| Ericsson | No | Agree with rapporteur. |
| Samsung | No | Agree with rapporteur. |
| Apple | No |  |
| MediaTek | No |  |
| Intel | No |  |
| ZTE | No | Agree with rapporteur. |
| LGE | No | Agree with rapporteur. |
| Sharp | No | Agree with rapporteur. |
| DENSO | No | Agree with rapporteur. |

**Summary:**

**Proposal:**

R[2-2205755](file:///E%3A%5C3GPP%E6%96%87%E6%A1%A3%5C%E4%BC%9A%E8%AE%AE%E6%96%87%E7%A8%BF%5C2022%5CRAN2%20118%5CR2-2205755.zip) proposes to “introduce mandatory values for Multi-USIM gap patterns” where the patterns are as defined in TS 38.133 9.1.10. RAN2 has previously agreed that this was not needed since the UE will request a gap pattern and the NW will either accept or reject it. The contribution argues that “Mandatory gap patterns increase the chances of the UE request to be attended and may facilitate the testing of the feature”.

**Question B4: Do you support introducing mandatory values for Multi-USIM gap patterns and the proposed UE capability for this?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Response** | **Comments** |
| OPPO | Maybe No | This proposal goes against RAN2 agreement and nothing is broken based on current spec, so we prefer to not have this. |
| vivo | No | Same view as OPPO. |
| Huawei/HiSilicon | No | The proposal from the paper was under the assumption that RAN4 introduces mandatory gap values if RAN2 agrees to introduce UE capability to indicate supported gap preferences. However RAN2 agreed that UE does not indicate its supported gap preferences. Hence this is not needed |
| NEC | No | Agree with HW. |
| Nokia |  | We can wait for RAN4 discussions to conclude on whether additional MUSIM gap patterns are mandatory or optional |
| Ericsson | Yes | If mandatory values for Multi-USIM gap patterns are agreed in RAN4, it would be useful to introduce them in RAN2 (as described in the contribution) |
| Samsung | No | Agree with HW |
| Apple | No | Agree with HW. |
| MediaTek | No |  |
| Intel | No | We don’t see a need for this decision in RAN2 or to change the previous agreement that network has to provide the UE requested gap. The issue regarding network configuration is not just knowledge of UE capability but also the potential renegotiation needed in case the gap does not satisfy the UE’s current requirement (even if UE supports the gap).  |
| ZTE | No | Agree with OPPO and HW |
| LGE | No |  |
| Sharp | No | RAN2 has already agreed this is not needed. |
| DENSO | No | Agree with HW |

**Summary:**

**Proposal:**

R[2-2205758](file:///E%3A%5C3GPP%E6%96%87%E6%A1%A3%5C%E4%BC%9A%E8%AE%AE%E6%96%87%E7%A8%BF%5C2022%5CRAN2%20118%5CR2-2205758.zip) discusses the signaling of MUSIM gap preferences. It is pointed out that the current signaling allows combinations of gap durations and cycles which are not listed in RAN4 specifications. Therefore, it proposes to “limit the UE report values defined by RAN4”. The suggested TP is to add text to the field description as follows:

***musim-GapPreferenceList***

Indicates the MUSIM gap(s) that the UE prefers to be configured with. The UE indicates preference for MUSIM gap(s) in accordance with clause 9.1.10 of TS 38.133.

**Question B5: Do you support the proposal in R**[**2-2205758**](file:///E%3A%5C3GPP%E6%96%87%E6%A1%A3%5C%E4%BC%9A%E8%AE%AE%E6%96%87%E7%A8%BF%5C2022%5CRAN2%20118%5CR2-2205758.zip) **to limit the UE MUSIM gap preferences to the values defined by RAN4 and the related TP above?**

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| --- | --- | --- |
| **Company** | **Response** | **Comments** |
| OPPO | Support | Fine to refer to RAN4 spec to avoid any misunderstanding. |
| vivo | Support | Fine to add the reference of TS38.133 for exact gap patterns. |
| Huawei/HiSilicon | Yes |  |
| NEC | Yes |  |
| Nokia  | Yes |  |
| Ericsson | Yes | Since RAN4 defined a number of gap patterns, RAN2 should avoid that the UE can use a configuration non agreed by RAN4. |
| Samsung | Yes |  |
| Apple | Yes |  |
| MediaTek | Yes |  |
| Intel | Yes | It could be useful to clarify that UE is not allowed to request any arbitrary gap pattern. |
| ZTE | Yes(see comments) | In the ASN.1 review CR (R2-2204892), the class 0 issue [Number 396] was also accepted, in which the similar clarification was added to the musim-AperiodicGap/musim-GapRepetitionAndOffset for the MUSIM gap config. Now in another offline[230], it was recommended to harmonize the Gap info structure for the UAI and reconfiguration, so maybe such kind of the clarification and be added to the final harmonized musim-GapInfo |
| LGE | Yes |  |
| Sharp | Yes |  |
| DENSO | Yes |  |

**Summary:**

**Proposal:**

## C. MUSIM gap configuration

In R[2-2205759](file:///E%3A%5C3GPP%E6%96%87%E6%A1%A3%5C%E4%BC%9A%E8%AE%AE%E6%96%87%E7%A8%BF%5C2022%5CRAN2%20118%5CR2-2205759.zip), it is observed that both *UEAssistanceInformation* message and *MUSIM-GapConfig* information element contain the same information in *MUSIM-GapInfo-r17* and *MUSIM-Starting-SFN-AndSubframe-SFN-AndSubframe-r17.* To eliminiate this repetition, it is proposed to “Harmonize the structure of the MUSIM *UEAssistanceInformation* and *MUSIM-GapConfig* information element”. The suggested changes are shown in the contribution, where *MUSIM-GapInfo* IE is defined separately and referred by both UAI and *MUSIM-GapConfig.*

**Question C1: Do you support the harmonization of MUSIM gap signaling as proposed in R**[**2-2205759**](file:///E%3A%5C3GPP%E6%96%87%E6%A1%A3%5C%E4%BC%9A%E8%AE%AE%E6%96%87%E7%A8%BF%5C2022%5CRAN2%20118%5CR2-2205759.zip)**?**

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| --- | --- | --- |
| **Company** | **Response** | **Comments** |
| OPPO | No strong view | If majority think this suggestion can make the spec more readable, we can follow the majority. |
| vivo | Yes | As *musim-Starting-SFN-AndSubframe-r17* is mandatory configured to UE, then in field description of musim-Starting-SFN-AndSubframe-r17 clarify that this field is mandatory present in *MUSIM-GapConfig.* |
| Huawei/HiSilicon | No | The proposed solution does not work. With the proposed changes, the UAI will have “conditional periodic and conditional aperiodic” codes. But the uplink message do not contain the conditional codes. |
| NEC | No | We agree with issue pointed out by HW.  |
| Nokia | No strong view |  |
| Ericsson | Yes | The proposal simplifies the ASN.1 structure and improves the readability of UEAssistanceInformation message and MUSIM-GapConfig IE. To Huawei’s comment, we can just clarify this in field description, we think the idea is more to agree on the harmonization as such, we can of course make small fixes if needed. |
| Samsung | See comments | We agree that there is need to harmonize between gap preference and gap config. We have provided a TP in R2-2205772 on how this can be done. |
| Apple | Yes |  |
| MediaTek | No srong view | The intention is fine but need further discussion on the details. |
| Intel | May be | We are OK to harmonise this. But our preference is to split the gap pattern IE to periodic and aperiodic gaps.  |
| ZTE | Yes | Similar view as Ericsson |
| LGE | No strong view |  |
| Sharp | No | Agree with Huawei.  |
| DENSO | Yes | Agree with Ericsson |

**Summary:**

**Proposal:**

R[2-2204614](file:///E%3A%5C3GPP%E6%96%87%E6%A1%A3%5C%E4%BC%9A%E8%AE%AE%E6%96%87%E7%A8%BF%5C2022%5CRAN2%20118%5CR2-2204614.zip) also proposes improvements to ASN.1 for MUSIM gap configurations. Here the basic idea is to “clearly isolate the periodic and aperiodic gap configurations into separate IEs”. Therefore, instead of the current common *MUSIM-GapInfo*, separate *MUSIM-PeriodicGapInfo* and *MUSIM-AperiodicGapInfo* IEs are introduced.

**Question C2: Do you support introducing separate periodic and aperiodic MUSIM gap information IEs as proposed in R**[**2-2204614**](file:///E%3A%5C3GPP%E6%96%87%E6%A1%A3%5C%E4%BC%9A%E8%AE%AE%E6%96%87%E7%A8%BF%5C2022%5CRAN2%20118%5CR2-2204614.zip)**?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Response** | **Comments** |
| OPPO | Seems not critical | The child-IE condition is already clear on how to use different type of MUSIM gap.But if majority think this suggestion can make the spec more readable, we can follow the majority. |
| vivo | No | Same view with OPPO. |
| Huawei/HiSilicon | No | The proposed solution contains musim-GapID for aperiodic gap information. This is not required/agreed. |
| NEC | No | Agree with OPPO. |
| Nokia | Yes | Introducing multiple conditions for periodic and aperiodic parameters in common structure makes difficult for understanding of the fields. As the nature of gaps are completely different, the definitions following the same principle is easier for clarity in the definition. |
| Ericsson | No | No big improve in the readability and it will duplicate some IEs (musim-GapID-r17 and musim-GapLength-r17) |
| Samsung | No | The proposed ASN.1 is not correct as other companies mentioned. |
| Apple | Not critical | Current definition is sufficient. |
| MediaTek | No srong view |  |
| Intel | Yes | The use of conditions is cumbersome and unnecessary. The ASN.1 will look a lot cleaner, easier to understand and more efficient with this split. |
| ZTE | Yes | We share the similar view as Nokia.  |
| LGE | No | But we are ok to follow the majority |
| Sharp | No | Agree with Ericsson. |
| DENSO | No srong view | Similar view as OPPO. |

**Summary:**

**Proposal:**

R2-2204614 has the following two editorial-type corrections for MUSIM gaps:

Proposal 1: Introduce text to describe the purpose of MUSIM measurement gaps.

Proposal 2: RAN2 to consider to align terminology where transmission of MUSIM assistance information without leaving RRC\_CONNECTED is replaced with gap preference.

The related TPs are also shown in the contribution. Since these are straight-forward changes with no impact to ASN.1 or functionality, they can be treated together.

**Question C3: Do you support Proposal 1 and 2 in R2-2204614 and the suggested changes shown in the contribution?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Response** | **Comments** |
| OPPO | Only support P1 | P1 may be needed considering we introduce the similar text for R16 PS WID; as for P2, this proposal seems not critical. |
| vivo | No strong view | P1 & P2 seem not critical. |
| Huawei/HiSilicon | No | The existing text is clear. We don’t think the changes are needed. |
| NEC | No strong view |  |
| Nokia | Support both | P2 is needed to have consistent specification language for the same feature in all places. Gap preference /Gap configuration is used in the ASN.1 for the feature for temporary switching without leaving. So the same term can be used in all places. |
| Ericsson | No strong view |  |
| Samsung | No strong view | We are under the impression that this change is not essential.  |
| Apple | No strong view |  |
| MediaTek | Support both P1 and P2 in R2-2204615 | At least P2 is needed.“MUSIM assistance information for gap preference” is better SPEC language than “MUSIM assistance information without leaving RRC\_CONNECTED”. We think “without leaving RRC\_CONNECTED” is good for 3GPP discussion but not so suitable in final SPEC. |
| Intel | No strong view. |  |
| ZTE | Support both with comments | For theP1, we think it should be MUSIM ~~measurement~~ gaps |
| LGE | No strong view |  |
| Sharp | No strong view |  |
| DENSO | No strong view |  |

**Summary:**

**Proposal:**

R[2-2205322](file:///E%3A%5C3GPP%E6%96%87%E6%A1%A3%5C%E4%BC%9A%E8%AE%AE%E6%96%87%E7%A8%BF%5C2022%5CRAN2%20118%5CR2-2205322.zip) has several proposals to clarify the usage of MUSIM gap parameters as follows, based on earlier RAN2 agreements.

Proposal 1: The network configured *musim-GapRepetitionAndOffset* shall be aligned with the UE requested.

Proposal 2: If the UE indicates the *musim-PrefStarting-SFN-AndSubframe*, the network can only configure the aperiodic Gap with the same start point or no aperiodic gap.

Proposal 2a: If the UE doesn’t indicate the *musim-PrefStarting-SFN-AndSubframe*, the network can configure the start point for the aperiodic gap flexibly.

Proposal 3: For the aperiodic Gap configuration, the *musim-Starting-SFN-AndSubframe* and *musim-GapLength* shall be mandatory present.

The only impact of these proposals are the following changes in field descriptions:

|  |
| --- |
| ***musim-GapRepetitionAndOffset***Indicates the gap repetition period in ms and gap offset in number of subframes for the periodic MUSIM gap without leaving RRC\_CONNECTED state as specified in TS 38.133 section 9.1.2D. It shall be aligned with the UE requested *musim-GapRepetitionAndOffset* in the *UEAssistanceInformation.* |
| ***musim-Starting-SFN-AndSubframe***Indicates gap starting position for the aperiodic MUSIM gap without leaving RRC\_CONNECTED state. This field is only used for aperiodic gap. It shall be aligned with the UE requested *musim-PrefStarting-SFN-AndSubframe (if present)* in the *UEAssistanceInformation.* |

**Question C4: Do you support the proposals and associated changes in R2-2205322?**

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| --- | --- | --- |
| **Company** | **Response** | **Comments** |
| OPPO | Support | This proposal is aligned with previous RAN2 agreements:* 1: Network should always provide at least one of the requested gap pattern or no gaps. Network providing an alternative gap pattern instead of the one requested by the UE is not supported in this release.
 |
| vivo | Support | As per RAN2 agreement, Network should always provide GapRepetitionAndOffset aligned with UE gap preference in UAI. Otherwise, the UE may miss paging reception. same handling could be adopted for musim-Starting-SFN-AndSubframe if present. |
| Huawei/HiSilicon | Support P1; please see comments | For P2/P2a and P3, they need to be discussed further. For P2a, if the UE does not provide start SFN and subframe, how can the NW decide proper aperiodic gap configuration for the UE as the NW does not have any information about the other NW’s RACH configuration for on-demand SI? So we think that it should be mandatory for the UE to proide start SFN and subframe if the UE requests aperiodic gap from NW. And in this case, musim-Starting-SFN-AndSubframe and musim-GapLength shall not be present in the aperiodic gap configuration as in P3. Instead it can be just an ENUMERATED value with setup as proposed in our paper (R2-2205312) |
| NEC | Support | But we think the changes in C4 overlap with the change in C5, maybe only one of them is sufficient. |
| Nokia | Partly | For aperiodic gap, gap preference need not be given if UE is OK to start at anytime. In the same way if Network don’t configure the gap, it starts immediately on reception of the message. So making everything mandatory is not necessary and reduces the flexibility in signalling. |
| Ericsson | Agree with P1 and P3 but not the proposed changes | We agreed that the UE does not report its supported gap patterns for MUSIM on UE capabilities. Hence, the network can only rely on what the UE sends to configure the MUSIM gaps to the UE, since it does not know what else the UE may support. There is no need to further clarify this since it is just business as usual for the handling of UE capabilities. This is lso stated in 38.331:A.8 MiscellaneousThe following miscellaneous convention should be used:- UE capabilities: TS 38.306 [26] specifies that the network should in general respect the UE's capabilities. Hence there is no need to include statement clarifying that the network, when setting the value of a certain configuration field, shall respect the related UE capabilities unless there is a particular need e.g. particularly complicated cases. |
| Samsung | Agree with P1/2 and P3, but not P2a | For P2a, we think that UE should always indicate ***musim-Starting-SFN-AndSubframe*** for aperiodic gaps which is clearly specified in the current specfiication.2> if the UE has a preference for MUSIM aperiodic gap:3> include the field *musim-GapPreferenceList*, with one entry for the aperiodic gap the UE prefers to be configured;4> set *musim-Gaplength* and *musim-Starting-SFN-AndSubframe* in the *musim-GapInfo* IEto the values of respectively the length and the starting SFN/subframe of the gap, respectively, the UE prefers to be configured with;Thus, we are not OK to update the highlighted text. It shall be aligned with the UE requested *musim-PrefStarting-SFN-AndSubframe (if present)* in the *UEAssistanceInformation.*We think that we can wait the outcome of ASN.1 review for MUSIM and then can decide whether to capture proposed changes in the field descrption (except '(if present)') if needed. |
| Apple | Support P1/P2/P3 but not P2a | Same view as Samsung |
| MediaTek | Support P1/P2/P3 but not P2a | Same view as Samsung |
| Intel | Support with the proposals but not the TP | We support all the proposals. But RAN2 does not normally capture the network behaviour with a “shall”. These should be rephrased.  |
| ZTE | Support (proponent) | For Huawei and Samsung’s comments, in the previous meeting, it has been agreed that“=>In the gap assistance information, UE provides gap repetition period and offset for periodic gaps, and (optionally) provides start SFN and subframe for the aperiodic gap.” In our paper we also mentioned that for some aperiodic Gap request, the UE may only care about the gap length, e.g. Msg-3 based on-demand SI in some RACH configurations, so the UE may not need to indicate start SFN and FN.For Samsung’s comments, it seems that some modification was also needed for the below text description.4> set *musim-Gaplength* and *musim-Starting-SFN-AndSubframe* in the *musim-GapInfo* IEto the values of respectively the length and the starting SFN/subframe of the gap, respectively, the UE prefers to be configured with; |
| LGE | Support | For P2a, the field *musim-Starting-SFN-AndSubframe* is optional so there is no problem not to set the field in UAI. |
| Sharp | Support |  |
| DENSO | Support P1/P2/P3 but not P2a | Agree with Samsung |

**Summary:**

**Proposal:**

R[2-2205197](file:///E%3A%5C3GPP%E6%96%87%E6%A1%A3%5C%E4%BC%9A%E8%AE%AE%E6%96%87%E7%A8%BF%5C2022%5CRAN2%20118%5CR2-2205197.zip) proposes to capture, either in 38.300 or 38.331, the following agreement by RAN2#117-e:

*Network should always provide at least one of the requested gap pattern or no gaps. Network providing an alternative gap pattern instead of the one requested by the UE is not supported in this release*

The contribution has TPs for 38.300 and 38.331.

**Question C5: Do you support capturing that RAN2 agreement on NW always providing one of the requested gap pateterns or no gaps? If yes, please indicate preference 38.300 or 38.331 and if the TP in R**[**2-2205197**](file:///E%3A%5C3GPP%E6%96%87%E6%A1%A3%5C%E4%BC%9A%E8%AE%AE%E6%96%87%E7%A8%BF%5C2022%5CRAN2%20118%5CR2-2205197.zip)**1 is acceptable.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Response** | **Comments** |
| OPPO | Only agree to capture in 38.331 | This issue is more related to stage3 limitation, so to capture in 38.331 is sufficient. Regarding the TP, we prefer to use TP in R2-2205322 as the baseline. |
| vivo | Yes, but | We are fine to capture that RAN2 agreement on NW always providing one of the requested gap pateterns or no gapsWe are fine for below either potential options:Option-1：change 38.331. changes in R2-2205322Option-2: change 38.300. we donot think it’s suitable to address network behaviour in 38.331. |
| Huawei/HiSilicon | Yes | We prefer to capture in both 38.300 and 38.331 |
| NEC |  | This changes overlaps with the changes in C4. If we only agree the changes in C5 but not C4, then we prefer to capture it in TS 38.331.If companies want both changes in C4 and C5, then we prefer the changes in C5 are captured in TS38.300. |
| Nokia | Yes | Only for 38.331 |
| Ericsson | No for 38.331Acceptable for 38.300 | See comments for C4 above. For stage 2, seems ok to clarify this since we also mention gap handling there. |
| Samsung | Prefer to have TP in 38.300. |  |
| Apple | Yes | We prefer to capture in both 38.300 and 38.331 |
| MediaTek | Yes | In 38.300 or in both 38.300/38.331, either way is fine to us. |
| Intel | Yes | Both. But note our response in previous question that 331 does not capture network behaviour with a “shall”.  |
| ZTE | Yes | This high level description can be included in the 38300. |
| LGE | Yes | No strong view but slightly prefer 38.300 |
| Sharp | Yes | Capture only in 38.300. |
| DENSO | Yes | We prefer to capture in 38.300 |

**Summary:**

**Proposal:**

## D. MAC behaviour during MUSIM gaps

Several contributions have proposals on the UE MAC behavior during MUSIM gaps. In particular, these are for restrictring UE transmission during gap times.

A related issue was discussed in RAN2#116 in the context of early termination of MUSIM gaps where the UE finishes the activity before the gap time (e.g. no paging) and whether the UE can then use the existing uplink signals, e.g. send SR, in the remaining time of the gaps. The following was captured in the Chair Notes:

*RAN2 does not intend to specify any new signalling in Rel-17 for early return. If legacy signalling allows it, RAN2 does not intend to preclude it.*

Based on the above agreement, there is currently no restriction for UE uplink transmission during MUSIM gaps.

In R[2-2205042](file:///E%3A%5C3GPP%E6%96%87%E6%A1%A3%5C%E4%BC%9A%E8%AE%AE%E6%96%87%E7%A8%BF%5C2022%5CRAN2%20118%5CR2-2205042.zip), R[2-2204895](file:///E%3A%5C3GPP%E6%96%87%E6%A1%A3%5C%E4%BC%9A%E8%AE%AE%E6%96%87%E7%A8%BF%5C2022%5CRAN2%20118%5CR2-2204895.zip), and R2-2205120, it is proposed to apply the restrictions applicable to measurement gaps described in 38.321 Section 5.14 to also MUSIM gaps. R[2-2204895](file:///E%3A%5C3GPP%E6%96%87%E6%A1%A3%5C%E4%BC%9A%E8%AE%AE%E6%96%87%E7%A8%BF%5C2022%5CRAN2%20118%5CR2-2204895.zip) also observes that the UE may initiate RACH during measurement gaps and this should also be allowed for MUSIM gaps. R2-2205120 in addition clarifies that the restriction should only be applied if the gap release has not been requested.

**Question D1: Do you agree that RACH transmissions should be allowed during MUSIM gaps, similar to legacy gaps, and support the associated changes in R2-2204895 for 38.321 Section 5.1.2?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Response** | **Comments** |
| vivo | Agree and support changes in R2-2204895 for 38.331 | We agree that RACH transmissions should be allowed during MUSIM gaps, similar to legacy gaps.Considering TS38.321 is not in the impacted existing TS/TR for MUSIM WI, it’s preferred to clarify the handling of MUSIM gaps in TS38.331 |
| Huawei/HiSilicon | Please see comments | If the “RACH transmission” here means the “random access preamble transmission”, we agree it can be up to UE implementation whether to consider the MUSI gap when selectiong the PRACH occasion, just as the case for measurement gap. |
| NEC | Yes | Agree with HW. And we think it should be captured in TS 38.321.  |
| Nokia | Yes | But need not be specified. It also depends on UE implementation whether UE will try RACH when its downlink is switched to other network. |
| Ericsson | Further discuss | It would be good to see the 38.331 suggestion so that we could compared with the 38.321 before taking a decision. |
| Samsung | Yes | It would be simpler to consider MUSIM gaps similar to measurement gaps. Prefer to capture only in RRC. |
| Apple | Yes | Similar view as Nokia. We prefer to leave this to UE implementation. |
| MediaTek | Yes | MUSIM gap should be similar to measurement gap |
| Intel | Yes |  |
| ZTE | Yes | We tend to leave this to UE implementation as other company suggested.  |
| LGE | Yes | Agree with HW |
| Sharp | Further discuss | Share Ericsson’s view. |
| DENSO | Yes | Agree with HW |

**Summary:**

**Proposal:**

**Question D2: Do you support restriction of other uplink transmission during MUSIM gaps and support the associated CR in R**[**2-2205042**](file:///E%3A%5C3GPP%E6%96%87%E6%A1%A3%5C%E4%BC%9A%E8%AE%AE%E6%96%87%E7%A8%BF%5C2022%5CRAN2%20118%5CR2-2205042.zip)**?**

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| --- | --- | --- |
| **Company** | **Response** | **Comments** |
| vivo | No | We agree the restriction of other uplink transmission during MUSIM gaps as specified in TS38.321 section 5.14 Handling of measurement gaps, but we think the change of TS38.321 is not in the scope of MUSIM WI, it’s preferred to clarify the handling of MUSIM gaps in TS38.331 as R2-2204895 discussed. |
| Huawei/HiSilicon | Yes |  |
| NEC | Yes |  |
| Nokia | No | Uplink transmission need not be restricted during MUSIM gap (periodic gap) which is meant for downlink only. |
| Ericsson | Yes |  |
| Samsung | Yes | It would be simpler to consider MUSIM gaps similar to measurement gaps.We think that RRC changes in.R2-2204895 are sufficient. |
| Apple | No |  |
| MediaTek | Yes | MUSIM gap should be similar to measurement gap and we don’t think it is possible for UE to do UL transmission in the MUSIM gap. Beside, what’s the point of UL HARQ if there is no DL transmission? We prefer to clarify the behavior in MAC SPEC (as measurement gap). |
| Intel | No | Early return is not prohibited and UE could send RACH and network may abort the gap. This option should not be precluded. |
| ZTE | Yes |  |
| LGE | No | Same view as Nokia |
| Sharp | Yes |  |
| DENSO | Yes | Agree with Samsung |

**Summary:**

**Proposal:**

**Question D3: If uplink transmissions are restricted during MUSIM gaps, do you support the change in R**[**2-2205120**](file:///E%3A%5C3GPP%E6%96%87%E6%A1%A3%5C%E4%BC%9A%E8%AE%AE%E6%96%87%E7%A8%BF%5C2022%5CRAN2%20118%5CR2-2205120.zip) **to clarify the release status of the gaps?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Response** | **Comments** |
| vivo | No | In our understanding, the release status of the gaps should be up to the network configuration message, but not UE preference. |
| Huawei/HiSilicon | No | There is no need for this. UE should follow the specified behaviour (i.e. after RRCReconfiguration with release of the scheduling gap) |
| NEC | No | Same view as vivo and HW. |
| Ericsson | No | Agree with vivo and HW. Furthermore this would be an optimization only, which would be too late for it. |
| Samsung | No | We think that this is a very tiny optimisation and not needed. |
| MediaTek | No |  |
| Intel | No | We don’t see a need to specify this optimisation. |
| ZTE | No |  |
| LGE | No |  |
| Sharp | Yes(proponent) | We think the following RAN2#116 agreement is about UL transmission:*RAN2 does not intend to specify any new signalling in Rel-17 for early return. If legacy signalling allows it, RAN2 does not intend to preclude it.*But in R2-2205120 we considered DL transmission. We discussed the situation that the periodic gap is no more needed and requested to be released. In this case the NW cannot release the gap during the gap duration even though UE will not switched to NW B during the sitiation. |
| DENSO | No | Agree with vivo and HW. |

**Summary:**

**Proposal:**

# Conclusion

Based on the discussion and the feedback from companies above, the following are proposed for the corrections of Rel-17 MUSIM gaps: