**3GPP TSG-RAN WG2 Meeting #117e R2-220xxxx**

E-Conference, 21st Feb – 3rd Mar. 2022

**Agenda item: 8.3.3**

**Source: vivo**

**Title: [Pre117-e][230][MUSIM] Summary Stage-3 details of MUSIM**

**WID: LTE\_NR\_MUSIM-Core**

**Document for: Discussion and Decision**

# Introduction

This document is to summarize Stage-3 aspects of MUSIM configuration based on companies’ contributions [6]-[33] according to the open issue list.

**[Pre117-e][230][MUSIM] Summary Stage-3 details of MUSIM (vivo)**

**Scope: Provide summary of Stage-3 aspects of MUSIM configuration according to open issue list.**

**Intended outcome: Summary document in R2-220xxxx.**

**Deadline: TBD**

The open issue list was identified in [2]:

|  |
| --- |
| **Cat1: Discussion after RAN4 feedback** **OI 1-1 and OI 1-2: Whether we can add more additional MGL/MGRP for periodic MUSIM gap and aperiodic MUSIM GAP?** **Cat2: pre117 -e offline****OI1-3: Whether Adopt the list with ToAddModList/ToReleaseList in RRCReconfiguration for the scheduling gap configuration and Introduce gap ID in RRCReconfiguration message for MUSIM to identify each configured gap, and support modification or release of gaps via gap ID.** **OI1-5: what is the maximum value of the prohibit timer for MUSIM UAI without leaving RRC\_CONNECTED state?****OI2-1: whether the configuration of “configured time” is mandatory when network configures UE to report the preference of leaving RRC\_CONNECTED state****OI2-2: what is the value range of the waiting timer for leaving RRC Connection state?****OI2-3: which alt is for the preferred RRC state indicator for switching notification with leaving RRC Connected state:** **Alt1: RRC\_IDLE or RRC\_INACTIVE****Alt2: RRC\_IDLE, RRC\_INACTIVE, outOfConnected****OI2-4: Reconfiguration (including HO) and RLF during the wait time.****OI3-1 : whether there is something to address ” Upon receiving the indication to erase any IMSI Offset value from upper layers, the UE shall set the IMSI Offset value to 0” in TS 36.304?** **OI3-2 : whether there is something to address” RAN2 do not introduce extra mechanisms for PO collision on SI change indication reception or ETWS/CMAS receptions.” in TS 36.304?****OI5-2: Whether in TS 38.306 and TS 36.306 that paging cause feature is optional feature without UE radio access capability parameters?** **OI5-3: Whether to store MUSIM assistance configuration (e.g. musim-AssistanceConfig) and MUSIM gap configuration (e.g. musim-GapConfig) in the UE Inactive AS context. If stored, when to release or any need to restore during RRC connection resume procedure.****OI5-4: When to release MUSIM assistance configuration (e.g. musim-AssistanceConfig) and MUSIM gap configuration (e.g. musim-GapConfig) during RRC connection re-establishment procedure.** **Cat3: Contributions are invited and treated****OI1-4: How does the UE indicate MUSIM gap release?** **OI5-1: Whether to indicate which MUSIM gap patterns are supported by UE (similar with UE capability supportedGapPattern in 38.306 ) based CR in RAN4 R4-2202760****Cat4: Contributions are ok however they can be treated best effort** **OI1-6: FFS indication from UE in UAI on the criticality or need for the gap location to be maintained at the same position as requested.****OI1-7: FFS UE behaviour until it received Network configuration related to gaps after requesting for gaps.****OI1-8: FFS UE behaviour during the gap duration that requested to be released in the UAI message****OI2-5: FFS UE behaviour when request of leaving RRC Connected is triggred for MUSIM or Power saving, but there is an ongoing procedure for Power saving or MUSIM.****OI2-6: Whether busy indication is supported by network or not should be indicated to UE?****OI4-1: whether Paging cause capability can be applied to MUSIM UEs and single USIM UEs. Send an LS to SA2 to indicate RAN2’s preference?** |

# Discussion

## Switching procedure without leaving RRC\_CONNECTED

**OI 1-1 and OI 1-2: Whether we can add more additional MGL/MGRP for periodic MUSIM gap and aperiodic MUSIM GAP?**

Companies’ views are summarized in table below:

|  |  |
| --- | --- |
| **Source** | **Related proposals** |
| vivo, R2-2202964 | we could wait for RAN4 LS feedback on the number of periodic MUSIM gap and aperiodic MUSIM gap. |
| Nokia, R2-2202740 | **Observation 1: Gap length needed by a UE for paging monitoring may be different depending on the UE radio conditions.****Observation 2: If only one periodic gap can be spent on paging reception from NW B, the gap length may consider the maximum time including at least 3 SSB reception for synchronization prior to the paging reception.****Proposal 1: RAN2 to agree on support of one additional periodic gap for efficient MUSIM operation during these gaps.** |

Totally 2 companies mentioned this open issue. One company suggested supporting of one additional periodic gap for efficient MUSIM operation during these gaps.

As there is no enough input to this open issue and the views from companies are diverse, no proposal is made.

**OI1-3: Whether adopt the list with ToAddModList/ToReleaseList in RRCReconfiguration for the scheduling gap configuration and Introduce gap ID in RRCReconfiguration message for MUSIM to identify each configured gap, and support modification or release of gaps via gap ID.**

In RAN2#116bis-e meeting, it’s agreed that: *Stage-3 details for gap configuration (e.g AddModReleaseList, gap id, gap modification) are postponed for now (pending the general MG discussion). Can consider P8/P9 as starting point from MUSIM perspective.*

P8/P9 in [3] is copied here for convenience:

* *Proposal 8: [17/20] Adopt the list with ToAddModList/ToReleaseList in RRCReconfiguration for the scheduling gap configuration*
* *Proposal 9: [15/19] Introduce gap ID in RRCReconfiguration message for MUSIM to identify each configured gap, and support modification or release of gaps via gap ID.*

Companies’ views are summarized in table below:

|  |  |  |
| --- | --- | --- |
| **Source** | **Yes/No** | **Related proposals** |
| vivo, R2-2202964 | **Yes** | **Proposal 1: Adopt the list with ToAddModList/ToReleaseList in RRCReconfiguration for the scheduling gap configuration and introduce gap ID in RRCReconfiguration message for MUSIM to identify each configured gap, and support modification or release of configured gaps via gap ID.** |
| OPPO, R2-2202206 | **Yes** | **Proposal 1: Adopt the list with *ToAddModList/ToReleaseList* in *RRCReconfiguration* for MUSIM gap configuration.****Proposal 2: Introduce gap ID in *RRCReconfiguration* message for MUSIM to identify each configured gap, and support modification or release of gaps via gap ID.** |
| Intel, R2-2202645 | No | As the maximum number of MUSIM gaps configured is 3, an addMod list is not essential. We don’t have a strong view either way but it would be good to align with the agreement on MGE |
| Huawei, R2-2202698 | **Yes** | **Proposal 1: Add the list with ToAddModList/ToReleaseList in RRCReconfiguration for the MUSIM gap configuration.****Proposal 1a: When the NW configures a new MUSIM gap for the UE, the NW configures a corresponding Gap Index in the ToAddModList together with the gap pattern configurations. When the NW releases a MUSIM gap for the UE, the NW indicates the Gap Index of the gap to be released in the ToReleaseList.** |
| LG, R2-2202856 | **Yes** | **Proposal 1. RAN2 introduces gap ID for multiple gap handling on both UL assistance information and DL configuration.****Proposal 2. RAN2 introduces addition/modification and release list for multiple gap handling on both UL assistance information and DL configuration.** |
| ZTE, R2-2202880 | **Yes,** At least for the periodic gaps | **Proposal 4: At least for the periodic Gaps it is simple to use “*ToAddModList*” and “*ToReleaseList*” with Gap ID.** |
| Ericsson, R2-2203434 | **Yes** | **Proposal 4 The list with ToAddModList/ToReleaseList in RRCReconfiguration can be adopted for the scheduling gap configuration.** |

Totally 7 companies mentioned this open issue. The majority [6/7] proposed to adopt the list with ToAddModList/ToReleaseList in RRCReconfiguration for the scheduling gap configuration with gap ID.

Following majority view, it’s proposed that:

1. **Introduce gap ID in *RRCReconfiguration* message for MUSIM to identify each configured gap, and support modification or release of configured gaps via gap ID. And adopt the list with *ToAddModList/ToReleaseList* in *RRCReconfiguration* for the scheduling gap configuration**

**OI1-4: How does the UE indicate** **MUSIM gap release?**

In RAN2#116bis-e[1], it’s agreed that:

|  |
| --- |
| * *FFS on UAI details (alt1 or alt2). Companies are requested to provide corresponding Stage-3 CRs to next meeting.*

*- Alt 1: If the UEAssistanceInformation does not include a field for aperiodic or periodic gap preference, it indicates no preference for the corresponding field for aperiodic or periodic gap.**- Alt 2: Each MUSIM gap configured by network A is associated with an index, UE can indicate which MUSIM gap should be released by including the corresponding MUSIM gap index into UEAssistanceInformation Message.* |

Companies’ views are summarized in table below:

|  |  |  |
| --- | --- | --- |
| **Source** | **Alt1/2** | **Related proposals** |
| vivo, R2-2202964 | Alt1 | **Proposal 2: If the UEAssistanceInformation does not include a field for MUSIM gap preference, it indicates no preference for the corresponding field for MUSIM gap.** |
| OPPO, R2-2202206 | Alt1 | **Proposal 3: If the UEAssistanceInformation does not include a field for aperiodic or periodic gap preference, it indicates no preference for the corresponding field for aperiodic or periodic gap.** |
| Samsung, R2-2202254 | Alt1 | **Observation: Depending on how the current MUSIM gap assistance information is different from the latest previous one, each alternative has pros and cons from a signalling point of view i.e.** * **If current MUSIM gap assistance information is a part of the latest previous one with/without new additional MUSIM gap assistance information, Alt 2 is more efficient than Alt 1**
* **If current MUSIM gap assistance information is completely different from the latest previous one or** **UE no longer has preference on MUSIM gap assistance information, Alt 1 is more efficient than Alt 2.**

**Proposal: Alt 1 is taken as a baseline for how UE indicates release of gap pattern.**  |
| Intel, R2-2202645 | Alt1 | **Observation #2: The default UAI signalling already provides the signalling means to indicate that a specific gap is not needed and can be released.****Proposal #2: An explicit mechanism for the UE to request the release of a gap pattern using gap ID is not needed for MUSIM purpose.** |
| Huawei, R2-2202698 | Alt1 | **Proposal 5: If the UEAssistanceInformation does not include a field for aperiodic or periodic gap preference, it indicates no preference for the corresponding field for aperiodic or periodic gap.** |
| ZTE, R2-2202880 | Alt1 | **Proposal 1: The UE shall be allowed to indicate aperiodic Gap release with UAI.****Proposal 2: If the musim-GapPreferenceList does not include a field for aperiodic or periodic gap preference, it indicates no preference for the corresponding field for aperiodic or periodic gap.** **Proposal 2a: If both the musim-GapPreferenceList and the musim-PreferredRRC-State-r17 are absent from the MUSIM-Assistance-r17, it indicates to release all of the configured MUSIM gaps.** |
| Ericsson, R2-2203434 | Alt1 | **Observation 1 To rely on the current UEAssistanceInformation framework also for MUSIM case reduces complexity both on the specifications and actual use of the MUSIM feature in UEAssistanceInformation.****Proposal 1 Adopt Alt.1. That is, if the UEAssistanceInformation does not include a field for aperiodic or periodic gap preference, it implies no preference for the corresponding field for aperiodic or periodic gap, i.e. the gap is released.****Observation 2 If Alt.1 is used, no changes are required in the running NR RRC CR for MUSIM (R2-2201997).****Observation 3 Whenever the UE asks for an aperiodic gap, the periodic gaps preference (if any) also have to be included in the message, otherwise the network interprets it as the periodic gaps are no longer needed.** |
| Apple, R2-2202517 | Alt2 | **Observation 1: There is a need to uniquely identify each gap pattern and the nature of gap pattern between UE and NW****Proposal 1: NW and UE can uniquely identify each configured gap pattern with a unique gap ID specific to the UE****Observation 2: UEs would require a signalling framework to release the configured switching gaps as and when the previous requirements that resulted in the configuration of switching gaps are no longer valid****Proposal 2: UE initiated RRC signalling should be able to refer to a specific switching gap via the unique gap ID to request for the gap release****Observation 3: The UAI framework can be used by UE to request for switching gap release as and when needed.****Proposal 3: Extend the UAI framework signalling to allow the UEs to request for switching gap release.** |
| Nokia, R2-2202740 | Alt2 | **Observation 3: Explicit indication of Gap Configuration to be released in UAI is more signalling efficient way to handle different gap change scenarios for MUSIM operation.****Proposal 3: MUSIM Gap Assistance Information include new parameter musimGapsToRelease. The text proposal for modification to MUSIM-Assistance information in running CR is given in Table 1** |
| China Telecom, R2-2202833 | Alt2 | **Proposal 1: UE can indicate which MUSIM gap should be released by including the corresponding MUSIM gap index into UEAssistanceInformation Message(Alt 2).**MUSIM-Assistance-r17 ::= SEQUENCE { musim-PreferredRRC-State-r17 ENUMERATED {IDLE, INACTIVE} OPTIONAL, musim-GapPreferenceList-r17 MUSIM-GapPreferenceList-r17 OPTIONAL, musim-GapReleaseList-r17 MUSIM-GapReleaseList-r17 OPTIONAL, ...}MUSIM-GapReleaseList-r17 ::= SEQUENCE (SIZE (1..3)) OF MUSIM-GapReleaseInfo-r17MUSIM-GapReleaseInfo-r17 ::= SEQUENCE { musim-GapIndex-Id-r17 INTEGER (0..2), ...}**Proposal 2: Introduce a new IE for MUSIM gap release and consider the signalling design above.** |
| LG, R2-2202856 | Alt2 | **Proposal 3. UE can request release of one or more configured gaps by sending gap ID(s) to be released in *UEAssistanceInformation* message.**MUSIM-Assistance-r17 ::= SEQUENCE { musim-PreferredRRC-State-r17 ENUMERATED {IDLE, INACTIVE} OPTIONAL, musim-GapRequestList-r17 MUSIM-GapRequestList-r17 OPTIONAL,musim-GapReleaseList-r17 MUSIM-GapReleaseList-r17 OPTIONAL, ...}MUSIM-GapReleaseList-r17 ::= SEQUENCE (SIZE (1..3)) OF MUSIM-GapId**Proposal 6. RAN2 is asked to consider our text proposals for the gap pattern ID handling in Annex.** |

Totally 11 companies mentioned this issue.

- **Alt 1: [7/11]** Proponents[6][32] pointed out that no changes are required in the running NR RRC CR for MUSIM [5] if Alt.1 is used.

|  |
| --- |
| 5.7.4.3 Actions related to transmission of *UEAssistanceInformation* message1> if transmission of the *UEAssistanceInformation* message is initiated to provide MUSIM assistance information according to 5.7.4.2: 2> if the UE has a preference for MUSIM gap(s):3> include *musim- GapPreferenceList*, FFS how to setup;2> else:3>do not include musim-*GapPreferenceList*; |

- **Alt 2: [4/11]**.

Proponents provided corresponding Stage-3 CR. E.g.

|  |
| --- |
| MUSIM-Assistance-r17 ::= SEQUENCE { musim-PreferredRRC-State-r17 ENUMERATED {IDLE, INACTIVE} OPTIONAL, musim-GapRequestList-r17 MUSIM-GapRequestList-r17 OPTIONAL,musim-GapReleaseList-r17 MUSIM-GapReleaseList-r17 OPTIONAL, ...}MUSIM-GapReleaseList-r17 ::= SEQUENCE (SIZE (1..3)) OF MUSIM-GapId |

Contribution[10] observed that: depending on how the current MUSIM gap assistance information is different from the latest previous one, each alternative has pros and cons from a signalling point of view i.e.

* If current MUSIM gap assistance information is a part of the latest previous one with/without new additional MUSIM gap assistance information, Alt 2 is more efficient than Alt 1
* If current MUSIM gap assistance information is completely different from the latest previous one or UE no longer has preference on MUSIM gap assistance information, Alt 1 is more efficient than Alt 2.

In rapporteur’s understanding, each alternative can work and has some benefits. Hence, the rapporteur proposes to follow the majority to go with Alt1.

1. **If the *UEAssistanceInformation* does not include a field for MUSIM gap preference, it indicates no preference for the corresponding field for MUSIM gap.**

**OI1-5: What is the maximum value of the prohibit timer for MUSIM UAI without leaving RRC\_CONNECTED state?**

In RAN2#116bis-e meeting, it’s agreed that: **“***NW is allowed to configure prohibit timer for MUSIM UAI, but it has to be allowed to be set to zero (i.e. no prohibit timer). FFS what is the maximum value (should be reasonable).”*

Companies’ views are summarized in table below:

|  |  |
| --- | --- |
| **Source** | **Related proposals** |
| vivo, R2-2202964 | If the prohibit timer is running, UE could not update UAI for MUSIM gap preference in time upon UE finishes cell reselection in NW B. Paging message from network B could be lost if the configured MUSIM gap doesn’t overlap with the PO to be monitored in the new camping cell. In our understanding, to avoid continuous missing of PO decoding in NW B, a reasonable maximum value of the prohibit timer for MUSIM UAI should be not more than one DRX cycle. The minimum DRX Cycle is 320ms. **Proposal 3: The maximum value of the prohibit timer for MUSIM UAI without leaving RRC\_CONNECTED state is not more than 320ms.** |
| OPPO, R2-2202206 | **Proposal 4: The following values are applicable for prohibit timer for MUSIM UAI without leaving RRC\_CONNECTED state:****{0s, 0.5s, 1s, 2s, 3s, 4s, 5s, 6s, 7s, 8s, 9s, 10s, 20s, 30s, spare2, spare1}.** |
| Intel, R2-2202645 | *delayBudgetReportingProhibitTimer ENUMERATED {s0, s0dot4, s0dot8, s1dot6, s3, s6, s12, s30}*rapporteur: it seems the same range of *delayBudgetReportingProhibitTimer* is proposed for MUSIM Prohibit timer |
| Huawei, R2-2202698 | **Proposal 2: The maximum value of the prohibit timer could be 30s.** |
| ZTE, R2-2202880 | **Proposal 5: The maximum value of the prohibit timer for MUSIM UAI without leaving RRC\_CONNECTED state can be set to 30s.** |
| Ericsson, R2-2203434 | **Proposal 2 The prohibit timer range is {0s, 0.5s, 1s, 2s, 3s, 4s, 5s, 6s, 7s, 8s, 9s, 10s, 20s, 30s}.** |

Totally 6 companies mentioned this issue.

The suggestion of the maximum value of the prohibit timer includes:

**Alt1**[5/6]: 30s. legacy prohibit timer range is proposed. Two contributions suggested the prohibit timer range {0s, 0.5s, 1s, 2s, 3s, 4s, 5s, 6s, 7s, 8s, 9s, 10s, 20s, 30s}.

**Alt2**[1/6]: 320ms. A reasonable maximum value of the prohibit timer for MUSIM UAI should be not more than one DRX cycle considering cell reselection case on NW B.

The rapporteur proposes to follow the majority view.

1. **The prohibit timer range is {0s, 0.5s, 1s, 2s, 3s, 4s, 5s, 6s, 7s, 8s, 9s, 10s, 20s, 30s}.**

## Switching procedure with leaving RRC\_CONNECTED

**OI2-1: Whether the configuration of musim-LeaveWithoutResponseTimer is mandatory when network configures UE to report the preference of leaving RRC\_CONNECTED state.**

Companies’ views are summarized in table below:

|  |  |
| --- | --- |
| **Source** | **Related proposals** |
| vivo, R2-2202964 | **Proposal 4: The configuration of musim-LeaveWithoutResponseTimer is optional. If the musim-LeaveWithoutResponseTimer is present, UE is configured to provide MUSIM assistance information for leaving RRC\_CONNECTED.** |
| Intel, R2-2202645 | We should avoid use of Need S in dedicated configuration – it is an unnecessary “optimization” and very often not an optimization at all. It should always be configured. It can be made mandatory or optional (if there is strong support for delta signalling) and if optional, the network requirement that it should always be configured can be captured in the field description.  |
| Huawei, R2-2202699 | If the UE determines to switch to the NW B, the UE will release the connection in NW A anyway. Thus, for Rel-17 autonomous release mechanism, once enabled, it means the UE can leave RRC\_CONNECTED state autonomously after a valid time period. From our point of view, it is reasonable for the NW to configure this timer for the UE if the NW enables the UAI for switching procedure with leaving RRC\_CONNECTED state for MUSIM**Proposal 1: It’s mandatory for the network to configure “configured time” once the network enables the UAI for switching procedure with leaving RRC\_CONNECTED state for MUSIM.****TP:**1> if configured to provide MUSIM assistance information for leaving RRC\_CONNECTED:2> if the UE needs to leave RRC\_CONNECTED state:3> initiate transmission of the UEAssistanceInformation message in accordance with 5.7.4.3 to provide MUSIM assistance information;3> start the timer T3xx with the timer value set to the *musim-LeaveWithoutResponseTimer*;OtherConfig-v17xy ::= SEQUENCE { musim-GapAssistanceConfig-r17 SetupRelease { MUSIM-GapProhibitTimer } OPTIONAL, -- Need M  musim-LeaveAssistanceConfig-r17 SetupRelease {MUSIM-LeaveWithoutResponseTimer} OPTIONAL, -- Need M  ...} rapporteur: according to the TP, the *musim-LeaveAssistanceConfig* is optional. LeaveWithoutResponseTimer is mandatory in the *musim-LeaveAssistanceConfig.* the present of *musim-LeaveAssistanceConfig* implies that the network enables the UAI for switching procedure with leaving RRC\_CONNECTED state for MUSIM. |
| ZTE, R2-2202880 | **Proposal 8: The configuration of “configured time” is conditional mandatory: the absence of the "configured time" indicateS that the switching notification for leaving RRC\_CONNECTED state was not enabled. Once the network enable the switching for leaving RRC\_CONNECTED state, the configured time shall be mandatory.** rapporteur: the *musim-LeaveAssistanceConfig* is optional. the present of *musim-LeaveAssistanceConfig* indicates that the switching notification for leaving RRC\_CONNECTED state was enabled.*musim-LeaveWithoutResponseTimer* is mandatory in the *musim-LeaveAssistanceConfig.*  |
| MediaTek, R2-2202925 | we think that the present of the configured wait timer implies that the feature is enabled.**Proposal 1: The configuration of “configured wait timer” is mandatory when network configures UE to report the preference of leaving RRC\_CONNECTED state.**OtherConfig-v17xy ::= SEQUENCE { musim-GapAssistanceConfig-r17 ENUMERATED{true} OPTIONAL, -- Need R musim-LeaveAssistanceConfig-r17 SetupRelease {Musim-LeaveWithoutResponseTimer} OPTIONAL -- Need M}Musim-LeaveWithoutResponseTimer ::= ENUMERATED{10ms, 20ms, 40ms, 60ms, 80ms, 100ms}**rapporteur**: according to the TP, *musim-LeaveAssistanceConfig* is optional. *musim-LeaveWithoutResponseTimer* is mandatory in *musim-LeaveAssistanceConfig*. the present of *musim-LeaveAssistanceConfig* implies that the feature is enabled, i.e. network configures UE to report the preference of leaving RRC\_CONNECTED state. |
| LG, R2-2203415 | once the UE decide to leave the current service with RRC connection release, the network should always help to quickly release the RRC connection and must provide the configuration of 'configured time' always for this.**Proposal 1. The network should always configure “the timer” for switching with leaving the RRC connection.** |
| Ericsson, R2-2203434 | **Proposal 5 The new RRC leaving timer is defined as optional timer: if the timer is not configured by the network, the UE shall behave as in legacy and wait until the network response is received.** |
| OPPO, R2-2202207 | we think the wait timer should be mandatorily configured once the switching notification for leaving RRC\_CONNECTED state is enabled.**Proposal 2: The configuration of “configured time” is mandatory when network configures UE to report the preference of leaving RRC\_CONNECTED state.**OtherConfig-v17xy ::= SEQUENCE { musim-GapAssistanceConfig-r17 SetupRelease {MUSIM-LeaveWithoutResponseTimer} OPTIONAL, -- Need M  musim-LeaveAssistanceConfig-r17 SetupRelease {MUSIM-LeaveWithoutResponseTimer} --  ...} |
| Nokia, R2-2202741 | **Proposal 1:** **RRC Configuration includes separate parameters for enabling switching notification for leaving and the wait timer value.**

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| --- |
| OtherConfig-v17xy ::= SEQUENCE { musim-GapAssistanceConfig-r17 SetupRelease {MUSIM-GapAssistanceConfig} OPTIONAL, -- Need M  musim-LeaveIndEnabled ENUMERATED(true) OPTIONAL, musim-LeaveWithoutResponseTimer ENUMERATED( values FFS) OPTIONAL} |

Table 1 : MUSIM RRC Configuration for switching notification for leaving**Proposal 1A: RAN2 to consider the changes proposed in otherConfiguration for switching notification for leaving.** |

Totally 9 companies mentioned this issue. Below options are suggested:

**Option #1[6/9]:***musim-LeaveAssistanceConfig* is optional. *musim-LeaveWithoutResponseTimer* is mandatory in musim-LeaveAssistanceConfig.

The TP is as below according to running CR[5].

|  |
| --- |
| 1> if configured to provide MUSIM assistance information for leaving RRC\_CONNECTED:2> if the UE needs to leave RRC\_CONNECTED state:3> initiate transmission of the UEAssistanceInformation message in accordance with 5.7.4.3 to provide MUSIM assistance information;3> start the timer T3xx with the timer value set to the *musim-LeaveWithoutResponseTimer*; |

|  |
| --- |
| OtherConfig-v17xy ::= SEQUENCE { musim-GapAssistanceConfig-r17 SetupRelease { MUSIM-GapProhibitTimer} OPTIONAL, -- Need M  musim-LeaveAssistanceConfig-r17 SetupRelease {MUSIM-LeaveWithoutResponseTimer} OPTIONAL, -- Need M  ...} |

There are several interpretations about the absence of *musim-LeaveAssistanceConfig (*it means the absence of *musim-LeaveWithoutResponseTimer* as well*)* :

**Option #1a:** the present of *musim-LeaveAssistanceConfig* indicates that UE is configured to provide MUSIM assistance information for leaving RRC\_CONNECTED[vivo, R2-2202964] [MediaTek, R2-2202925] [Intel, R2-2202645] [Huawei, R2-2202699] [ZTE, R2-2202880]

**Option #1b:** If the timer is not configured by the network, the UE shall behave as in legacy and wait until the network response is received.[Ericsson, R2-2203434]

**Option #2:** The configuration of musim-LeaveWithoutResponseTimer is mandatory. [OPPO, R2-2202206]

|  |
| --- |
| OtherConfig-v17xy ::= SEQUENCE { musim-GapAssistanceConfig-r17 SetupRelease {MUSIM-LeaveWithoutResponseTimer} OPTIONAL, -- Need M  musim-LeaveAssistanceConfig-r17 SetupRelease {MUSIM-LeaveWithoutResponseTimer} --  ...} |

**Option #3:** RRC Configuration includes separate parameters for enabling switching notification for leaving and the wait timer value. [Nokia, R2-2202741]

|  |
| --- |
| OtherConfig-v17xy ::= SEQUENCE { musim-GapAssistanceConfig-r17 SetupRelease {MUSIM-GapAssistanceConfig} OPTIONAL, -- Need M  musim-LeaveIndEnabled ENUMERATED(true) OPTIONAL, musim-LeaveWithoutResponseTimer ENUMERATED( values FFS) OPTIONAL} |

The rapporteur proposes to follow the majority view.

1. ***musim-LeaveAssistanceConfig* is optional. *musim-LeaveWithoutResponseTimer* is mandatory in musim-LeaveAssistanceConfig. The present of *musim-LeaveAssistanceConfig* indicates that UE is configured to provide MUSIM assistance information for leaving RRC\_CONNECTED.**

**OI2-2: What is the value range of *musim-LeaveWithoutResponseTimer* for leaving RRC Connection state?**

Companies’ views are summarized in table below:

|  |  |
| --- | --- |
| **Source** | **Related proposals** |
| vivo, R2-2202964 | **Proposal 5: The value range of musim-LeaveWithoutResponseTimer for leaving RRC Connection state is defined as {10ms, 20ms, 40ms, 60ms, 80ms, 100ms}.** |
| OPPO, R2-2202207 | **Proposal 3: The value range of the “configured time” for leaving RRC Connection state includes {10ms, 20ms, 40ms, 60ms, 80ms, 100ms}.** |
| Intel, R2-2202645 | We think the suggested value range should be increased as the lower values seems a bit unrealistic and it does not give enough time for a network response and for UE to process the response. |
| Huawei, R2-2202699 | **Proposal 2: The maximum value of the “configured time” is 80ms.**MUSIM-LeaveWithoutResponseTimer ::= ENUMERATED{20ms, 40ms, 60ms, 80ms} |
| ZTE, R2-2202880 | **Proposal 6: The waiting timer shall be started after the UE receiving the corresponding RLC ACK.****Proposal 7: The range of the waiting timer can be {20, 40, 60, 80, 100} ms.** |
| MediaTek, R2-2202925 | **Proposal 2: The value range of the waiting timer for leaving RRC Connection state is defined as {10ms, 20ms, 40ms, 60ms, 80ms, 100ms}.** |
| Ericsson, R2-2203434 | **Proposal 6 The value range of the waiting timer for leaving RRC Connection state, if configured, is {10ms, 20ms, 40ms, 60ms, 80ms, 100ms, 200ms}.** |

Totally 7 companies mentioned this issue. The company’s views regarding the value range of *musim-LeaveWithoutResponseTimer* are summarized as below:

**Alt1: {10ms, 20ms, 40ms, 60ms, 80ms, 100ms}** [vivo, R2-2202964][OPPO, R2-2202207][MediaTek, R2-2202925]

**Alt2: {10ms, 20ms, 40ms, 60ms, 80ms, 100ms, 200ms}** [Ericsson, R2-2203434]

**Alt3: {20ms, 40ms, 60ms, 80ms, 100ms}** [ZTE, R2-2202880]

**Alt4: {20ms, 40ms, 60ms, 80ms}** [Huawei, R2-2202699]

For the minimum value of the “configured time”, 4 companies proposed 10ms, 2 companies propose 20ms. For the maximum value of the “configured time”, 4 companies propose 100ms, 1 company proposes 80ms, and 1 company proposes 200ms.

And 1 company think lower values seems a bit unrealistic and think the value range suggested in previous email discussion should be increased.

The rapporteur proposes to follow the majority view.

1. **The value range of *musim-LeaveWithoutResponseTimer* for leaving RRC Connection state is defined as {10ms, 20ms, 40ms, 60ms, 80ms, 100ms}.**

**OI2-3: Which alt is for the preferred RRC state indicator for switching notification with leaving RRC Connected state:**

**Alt1: {RRC\_IDLE , RRC\_INACTIVE}**

**Alt2: {RRC\_IDLE, RRC\_INACTIVE, outOfConnected}**

Companies’ views are summarized in table below:

|  |  |  |
| --- | --- | --- |
| **Source** | **Alt1/2** | **Related proposals** |
| vivo, R2-2202964 | Alt1 | **Proposal 6: The preferred RRC state indicator for switching notification with leaving RRC Connected includes state {RRC\_IDLE, RRC\_INACTIVE}.** |
| OPPO, R2-2202207 | Alt2 | **Proposal 1: When the UE has the preference to leave RRC\_CONNECTED at network A for switching, UE informs NW that the preferred RRC state is RRC\_IDLE, RRC\_INACTIVE, or No Preference (e.g. 3 different value as {idle, inactive, outOfConnected}.** |
| Apple, R2-2202517 | Alt2 | **Observation 4: Having OutOfConnected option in preferred RRC State for leaving RRC CONNECTED for MUSIM Network switching provides additional flexibility and is well aligned with existing state preference UAI indication framework.****Proposal 4: Include OutOfConnected as one of the preferred RRC State options for leaving RRC CONNECTED state on NW A for MUSIM Network Switching.** |
| Intel, R2-2202645 | Alt1 | We don’t see it essential to support for “out of connected” for MUSIM but we are open if majority prefer to have it. |
| Huawei, R2-2202699 | Alt2 | **Proposal 3: UE reports the preferred RRC state, for which the value can be set to idle, inactive or outOfConnected in MUSIM assistance information when the UE initiates the switching procedure with leaving RRC\_CONNECTED state.****• The value idle is indicated if the UE prefers to be released from RRC\_CONNECTED and transit to RRC\_IDLE.** **• The value inactive is indicated if the UE prefers to be released from RRC\_CONNECTED and transit to RRC\_INACTIVE.** **• The value outOfConnected is indicated if the UE prefers to be released from RRC\_CONNECTED and has no preferred RRC state to transit to.** |
| MediaTek, R2-2202925 | Alt2 | **Proposal 3: For switching notification with leaving RRC Connected state, the UE could inform network the preferred RRC state is RRC\_IDLE, RRC\_INACTIVE, or No Preference.** |
| LG, R2-2203415 | Alt2 | **Proposal 2. outOfConnected can be set by one of the preferred RRC state indicators for switching notification.** |
| Ericsson, R2-2203434 | Alt1 | **Proposal 7 Alternative 1 (RRC\_IDLE or RRC\_INACTIVE) can be used as preferred RRC state indicator for switching notification with leaving RRC Connected state.** |

Totally 8 companies mentioned this issue. The company’s views are summarized as below:

**Alt1[3/8]: {RRC\_IDLE , RRC\_INACTIVE},** 1 company is open to Alt2.

**Alt2[6/8]: {RRC\_IDLE, RRC\_INACTIVE, outOfConnected}, 5 companies support alt2, and 1 company supporting alt1 is open to follow the majority.**

 “outOfConnected” is the point in dispute. One company thought that having OutOfConnected option in preferred RRC State for leaving RRC CONNECTED for MUSIM Network switching provides additional flexibility and is well aligned with existing state preference UAI indication framework

Based on the inputs from companies, rapporteur suggests to go for majority.

1. **The preferred RRC state indicator for switching notification with leaving RRC Connected includes state {RRC\_IDLE, RRC\_INACTIVE, outOfConnected}**

**OI2-4: Reconfiguration (including HO) and RLF during the wait time.**

Email[4] has provided below proposals:

* *Proposal 7: While the wait timer for switching notification to leave RRC connected state is running, the UE may not detect RLF or initiate connection re-establishment procedure. No SPEC change is needed.*
* *Proposal 8: While the wait timer for switching notification to leave RRC connected state is running, the UE may not trigger CHO and may not perform handover command. No SPEC change is needed.*
* *Proposal 9: RAN2 does not specify additional UE behavior on receiving reconfiguration of wait timer while wait timer is running. The current running CR is enough.*

Companies’ views are summarized regarding supporting above proposals in table below:

|  |  |
| --- | --- |
| **Source** | **Related proposals** |
| vivo, R2-2202964 | **Proposal 7: While the wait timer for switching notification to leave RRC connected state is running, the UE is not required to detect RLF or initiate connection re-establishment procedure. No SPEC change is needed.****Proposal 8: While the wait timer for switching notification to leave RRC connected state is running, the UE is not required to trigger CHO and may not perform handover command. No SPEC change is needed.****Proposal 9: RAN2 does not specify additional UE behavior on receiving reconfiguration of wait timer while wait timer is running.** |
| OPPO, R2-2202207 | **Proposal 4: RAN2 to agree the following:** **While the wait timer for switching notification to leave RRC connected state is running, the UE may not detect RLF or initiate connection re-establishment procedure. No SPEC change is needed.****While the wait timer for switching notification to leave RRC connected state is running, the UE may not trigger CHO and may not perform handover command. No SPEC change is needed.****RAN2 does not specify additional UE behavior on receiving reconfiguration of wait timer while wait timer is running. The current running CR is enough.** |
| Huawei, R2-2202699 | **Proposal 4: UE is allowed to not initiate connection re-establishment procedure upon the RLF occurs if the timer of the “configured time” for MUSIM is running.****Proposal 5: UE performs handover procedure if it receives handover command while the timer for “configured time” is running and if the timer “configured time” expires, it should go to RRC\_IDLE. No special handling needs to be specified.** |
| MediaTek, R2-2202925 | **Proposal 4: While the wait timer for switching notification to leave RRC connected state is running, the UE may not detect RLF or initiate connection re-establishment procedure. No SPEC change is needed.****Proposal 5: While the wait timer for switching notification to leave RRC connected state is running, the UE may not trigger CHO and may not perform handover command. No SPEC change is needed.****Proposal 6: RAN2 does not specify additional UE behavior on receiving reconfiguration of wait timer while wait timer is running. The current running CR is enough.** |
| Sharp, R2-2202938 | **Observation 1: if UE performs a CHO during a running T3xx, it may lead to unnecessary signalling overhead and power consumption, and further delay the switching to NW-B.****Proposal 1: UE does not perform CHO even if the execution conditions are fulfilled when UE has sent a request for leaving RRC connected to the network.****Proposal 2: UE does not perform RRRC reestablishment when UE has sent a request for leaving RRC connected to the network.** |
| Ericsson, R2-2203434 | **Proposal 8 When the leaving timer is running, the UE does not detect any possible RLF.****Observation 4 Whether to re-start a UAI timer upon reconfiguring UAI should be discussed also for Rel-15/Rel-16 fields.****Proposal 9 The behavior for the leaving timer upon receiving an RRCReconfiguration message should follow the same behavior as for other IEs configured for UAI. The same behavior applies regardless if reconfigurationWithSync is present or not in the RRCReconfiguration message.** |
| Intel, R2-2202645 | We don’t see a need to discuss or optimise for these corner cases. By default, as per current specifications, UE has to comply with the current specification during the wait time. We also do not agree that “No spec change is needed” does not imply that UE is not allowed to initiate these procedures. |
|  |  |
| Samsung, R2-2202240 | **Proposal 2: UE stops the configured wait timer (e.g. *musim-LeaveWithoutResponseTimer*), if running if *musim-LeaveAssistanceConfig* is set to release.**  |
| Lenovo, R2-2202573 | **Proposal 1: The UE shall restart the MUSIM timer if it receives RRC reconfiguration message reconfiguring MUSIM-LeaveWithoutResponseTimer with a new value (while the MUSIM timer is running).****Proposal 2: The UE shall stop the MUSIM timer if UE may receive RRC reconfiguration message indicating to release MUSIM-LeaveWithoutResponseTimer while the MUSIM timer is running.****Observation 1: It is possible that UE performs handover when the timer is running. For example, the CHO execution condition in network A is met while the timer is running. Or the UE receives the handover command while the timer is running.****Proposal 3: UE shall stop the MUSIM timer when it executes handover and the MUSIM timer is running.** |
| Nokia, R2-2202741 | **Proposal 3: UE should complete the re-establishment procedure and inform switching notification if RLF is declared while wait timer is running if the preferred state is RRC-INACTIVE.****Proposal 4: UE should complete network initiated RRC Reconfiguration procedure when wait timer is running for leave notification.** |
| ASUSTeK, R2-2202845 | **Proposal 1: MUSIM UE performs handover if handover command is received when new RRC timer for “configured time” is running.****Proposal 2: New RRC timer for “configured time” is stopped if handover command is received when the new RRC timer is running.****Proposal 3: MUSIM UE performs RRC connection re-establishment if RLF occurs when new RRC timer for “configured time” is running.****Proposal 4: New RRC timer for “configured time” is stopped if RLF occurs when the new RRC timer is running.** |

Totally 11 companies mentioned this issue. The company’s views are summarized as below:

|  |  |  |
| --- | --- | --- |
| **Proposal** | **Proponent** | **Opponent** |
| *Proposal 7: While the wait timer for switching notification to leave RRC connected state is running, the UE may not detect RLF or initiate connection re-establishment procedure. No SPEC change is needed.* | [vivo, R2-2202964][OPPO, R2-2202207][Huawei, R2-2202699][MediaTek, R2-2202925][Sharp, R2-2202938][Ericsson, R2-2203434] | [Nokia, R2-2202741][ASUSTeK, R2-2202845] |
| *Proposal 8: While the wait timer for switching notification to leave RRC connected state is running, the UE may not trigger CHO and may not perform handover command. No SPEC change is needed.* | [vivo, R2-2202964][OPPO, R2-2202207][Huawei, R2-2202699][MediaTek, R2-2202925][Sharp, R2-2202938] |  |
| *Proposal 9: RAN2 does not specify additional UE behavior on receiving reconfiguration of wait timer while wait timer is running. The current running CR is enough.* | [vivo, R2-2202964][OPPO, R2-2202207][MediaTek, R2-2202925][Ericsson, R2-2203434] | [ Samsung, R2-2202240][Lenovo, R2-2202573][ASUSTeK, R2-2202845] |

In the rapporteur’s understanding, this issue related to optimizations. As there is no majority support to specify the issue, the rapporteur proposes to deprioritize the discussion and makes the following proposals:

1. **While the wait timer for switching notification to leave RRC connected state is running, the UE is not required to detect RLF or initiate connection re-establishment procedure. No SPEC change is needed.**
2. **While the wait timer for switching notification to leave RRC connected state is running, the UE is not required to trigger CHO and may not perform handover command. No SPEC change is needed.**
3. **RAN2 does not specify additional UE behavior on receiving reconfiguration of wait timer while wait timer is running.**

## UE capabilities and other aspects

**OI5-3: Whether to store MUSIM assistance configuration (e.g. *musim-AssistanceConfig*) and MUSIM gap configuration (e.g. *musim-GapConfig*) in the UE Inactive AS context. If stored, when to release or any need to restore during RRC connection resume procedure.**

Companies’ views are summarized in table below:

|  |  |
| --- | --- |
| **Source** | **Related proposals** |
| vivo, R2-2202964 | **Proposal 11: UE stores MUSIM assistance configuration when entering RRC\_INACTIVE state. Upon initiation of RRC connection resume, the UE releases musim-AssistanceConfig from the UE Inactive AS context.****Proposal 12: UE stores musim-GapConfig when entering RRC\_INACTIVE state. Upon initiation of RRC connection resume, the UE releases musim-GapConfig from the UE Inactive AS context.** |
| Apple, R2-2202517 | **Observation 5: Preserving the MUSIM assistance and gap configuration as part UE’s INACTIVE context on NW A, allows for seamless context store and restore of this configuration during short periods of INACTIVE to CONNECTED state transition and back.** **Observation 6: UE can always request for an updated gap configuration, in cases when there is a genuine need for such an update****Proposal 6: Store the MUSIM assistance configuration and gap configuration as part of UE’s RRC INACTIVE context****Observation 7: MUSIM assistance and gap configuration need to be released when the UE transitions from RRC CONNECTED to RRC IDLE either due to RRC Connection Re-Establishment failure or RRC Release procedure.****Proposal 7: UE shall release the MUSIM assistance and gap configuration on entering RRC IDLE state.** |
| Intel, R2-2202645 | We should follow the current behaviour defined for the rest of UAI and release this on initiating Resume. |
| Huawei, R2-2202698 | **Proposal 3: The UE shall store the MUSIM assistance configuration, i.e. musim-GapAssistanceConfig and musim-LeaveAssistanceConfig and MUSIM gap configuration, i.e musim-GapConfig in the UE Inactive AS context.****Proposal 3a: The UE shall release the MUSIM assistance configuration, i.e. musim-GapAssistanceConfig and musim-LeaveAssistanceConfig upon the UE initiates the RRC connection resume procedure.****Proposal 3b: The UE shall release the MUSIM gap configuration upon the UE initiates the RRC connection resume procedure.** |
| Ericsson, R2-2203434 | **Proposal 3 The MUSIM UE stores the MUSIM assistance configuration, but it is released upon RRC resume and re-establishment procedures.** |

Totally 5 companies mentioned this issue. All the companies suggest that the UE stores musim-GapAssistanceConfig, musim-LeaveAssistanceConfig and musim-GapConfig in the UE Inactive AS context, and release them upon RRC resume procedures.

We have the below proposal :

1. **UE stores *musim-GapAssistanceConfig, musim-LeaveAssistanceConfig* and *musim-GapConfig* when entering RRC\_INACTIVE state. Upon initiation of RRC connection resume, the UE releases *musim-GapAssistanceConfig* from the UE Inactive AS context.**

**OI5-4: When to release MUSIM assistance configuration (e.g. musim-AssistanceConfig) and MUSIM gap configuration (e.g. musim-GapConfig) during RRC connection re-establishment procedure.**

Companies’ views are summarized in table below:

|  |  |
| --- | --- |
| **Source** | **Related proposals** |
| vivo, R2-2202964 | **Proposal 13: Upon initiation of RRC connection re-establishment, the UE releases MUSIM assistance configuration, if configured.****Proposal 14: Upon reception of the RRCReestablishment message, the UE releases the gap configuration indicated by the musim-GapConfig, if configured.** |
| Intel, R2-2202645 | We should follow the current behaviour defined for the rest of UAI and release this on re-establishment. |
| Huawei, R2-2202698 | **Proposal 4a: The UE shall release the MUSIM assistance configuration, i.e. musim-GapAssistanceConfig and musim-LeaveAssistanceConfig upon the UE initiates the RRC connection re-establishment procedure.****Proposal 4b: The UE shall release the MUSIM gap configuration upon the UE initiates the RRC connection re-establishment procedure.** |
| Ericsson, R2-2203434 | **Proposal 3 The MUSIM UE stores the MUSIM assistance configuration, but it is released upon RRC resume and re-establishment procedures.** |

Totally 4 companies mentioned this issue. All the companies suggest that the UE releases musim-GapAssistanceConfig, musim-LeaveAssistanceConfig and musim-GapConfig in the UE Inactive AS context during RRC connection re-establishment procedure.

In rapporteur’s understanding, majority view is to follow the current behaviour defined for the rest of UAI and release this on re-establishment. i.e.:

* upon initiation of RRC connection re-establishment, the UE releases any parameters configured in the otherConfig, such as *delayBudgetReportingConfig*, *overheatingAssistanceConfig*, *idc-AssistanceConfig*, etc. the same could be applied for MUSIM assistance configuration.
* During RRC connection re-establishment, it is specified that the UE autonomously releases existing measurement gap configuration, if configured, upon reception of the RRCRestablishment message. the same principle could be applied for MUSIM gap configuration, i.e. upon reception of the RRCReestablishment message, the UE releases the gap configuration indicated by the musim-GapConfig, if configured.

Based on the inputs from companies, we have the below proposals:

1. **Upon initiation of RRC connection re-establishment, the UE releases *musim-GapAssistanceConfig* and *musim-LeaveAssistanceConfig*, if configured.**
2. **Upon reception of the RRCReestablishment message, the UE releases the gap configuration indicated by the musim-GapConfig, if configured.**

## Cat4 Issues: Contributions are ok however they can be treated best effort

**OI1-6: FFS indication from UE in UAI on the criticality or need for the gap location to be maintained at the same position as requested.**

Proponent’s comment for this open issue:

*RAN4 discussions indicate that if MG overlpas with MUSIM requested gap, UE should do NTWK-A operation on the MG-Gap not MUSIM operation. This will result in UE not monitoring PO in this stage leading to paging collision.*

Companies’ views are summarized in table below:

|  |  |
| --- | --- |
| **Source** | **Related proposals** |
| Nokia, R2-2202740 | **Observation 4: As per RAN4 discussions for Rel-17 MUSIM, Gap sharing between MUSIM gaps and measurement gaps are considered in Rel-17. If the gaps overlap NTWK-A operation should be completed during the gap.****Observation 5: Gap Location for MUSIM Gap for paging monitoring should not be altered or should not overlap with measurement gap for un-interrupted paging reception at NTWK-B during MUSIM Gap.****Proposal 4: Gap-Priority is included in MUSIM-Gap-Info as per the TP given in Table 2**

|  |
| --- |
| MUSIM-GapInfo-r17 ::= SEQUENCE { musim-Starting-SFN-AndSubframe-r17 MUSIM-Starting-SFN-AndSubframe-r17 OPTIONAL, musim-GapLength-r17 ENUMERATED {ms4, ms5dot5, ms6, ms10, ms20}, musim-GapRepetitionAndOffset-r17 CHOICE { ms20-r17 INTEGER (0..19), ms40-r17 INTEGER (0..39), ms80-r17 INTEGER (0..79), ms160-r17 INTEGER (0..159), ms320-r17 INTEGER (0..319), ms640-r17 INTEGER (0..639), ms1280-r17 INTEGER (0..1279), ms2560-r17 INTEGER (0..2559), ...} OPTIONAL -- Cond periodic, Musim-GapPriority ENUM(high) -- OPTIONAL}MUSIM-Starting-SFN-AndSubframe-r17 ::= SEQUENCE { starting-SFN-r17 INTEGER (0..1023), startingSubframe-r17 INTEGER (0..9)}**Musim-GapPriority: If this field is included, the Gap configuration should ensure that NTWK-B operation is possible at the requested gap-offset for this gap.**  |

**Table 2: Inclusion of Gap-Priority in MUSIM-Gap-Info.** If the received MUSIM Gap configuration in RRC Reconfiguration message is not acceptable for the UE to continue with MUSIM operation with the given gaps, UE may need to reject the complete configuration and initiate the procedure related to RRC configuration failure. This will result in re-establishment procedure from the UE. As the configuration issue is only limited to MUSIM operation, it is preferred to report this failure in other means without triggering the legacy re-establishment procedure. Alternatively, the UE may indicate that the configured values are not acceptable in another UAI message with flag that requested gap configuration is mandatory. In this case the network should disable MUSIM Gap Assistance operation itself instead of attempting to configure the gaps.**Proposal 5: RAN2 to discuss the UE behaviour on reconfiguration failure scenario for RRC Reconfiguration with MUSIM Gap configurations.** |
| Huawei, R2-2202698 | Our understanding is that RAN4 did not make agreement and the majority opined in RAN4 to not define any such UE behaviour. Hence RAN2 does not need to address this. If at all, there is a paging collision, UE implementation can handle it. |

Two companies discussed this issue, there is no clear majority to address this issue in RAN2.

**OI1-7: FFS UE behaviour until it received Network configuration related to gaps after requesting for gaps.**

Proponent’s comment for this open issue:

*Whether UE can start using the requested gaps until receiving network configuration or need to wait until network configuration is not clear. In case if network command is not provided can UE continue to use the requested gaps ?*

Companies’ views are summarized in table below:

|  |  |
| --- | --- |
| **Source** | **Related proposals** |
| Apple, R2-2202517 | **Observation 8: UE applying updated gap configuration without NW confirmation can lead to out of sync issue for RRC CONNECTED mode of operation on NW A.****Proposal 8: UE shall wait for NW confirmation from NW A prior to using the updated MUSIM gap configuration.** |
| Huawei, R2-2202698 | When UE requests the NW for MUSIM gaps, it has to wait until it receives the MUSIM gap configuration from the NW. If UE does not receive the MUSIM gap configuration, it can request the NW again. There is no need to define UE behaviour before it receives configuration from the NW. |

Two companies discussed this issue and both thought UE shall wait for NW confirmation from NW A prior to using the updated MUSIM gap configuration. There is no need to define UE behaviour before it receives configuration from the NW.

Following companies’ views, RAN2 does not need to address this issue.

**OI1-8: FFS UE behaviour during the gap duration that requested to be released in the UAI message**

Proponent’s comment for this open issue:

*When UE request to release a gap pattern in a UAI message, whether it can be scheduled during the gap duration after sending the UAI message but before receiving the response message?*

Companies’ views are summarized in table below:

|  |  |
| --- | --- |
| **Source** | **Related proposals** |
| Huawei, R2-2202698 | Similar to OI1-7, when UE requests the NW to release the MUSIM gaps, it has to wait until it receives the RRCReconfiguration message indicating the release of the MUSIM gaps. There is no need to define autonomous release of the MUSIM gaps by the UE. |
| Sharp, R2-2202770 | **Observation 1 UE cannot be scheduled during the scheduling gap requested to be released if UE stop using the gap pattern only when a release indication is received from the network, which will reduce the throughput of current network.****Proposal 1: UE should stop using of a scheduling gap when a UAI message used to request release of the scheduling gap is transmitted.** |
| LG, R2-2202856 | **Proposal 5. The UE should start gap operation or release the gap upon receiving network configuration.** |

Two companies think there is no need to define autonomous release of the MUSIM gaps. And 1 company thinks autonomous release of the MUSIM gaps is needed.

In the rapporteur’s understanding, the autonomous release of the MUSIM gaps is an optimization and is not critical to be addressed in this release. Hence, no proposal is made here.

**OI2-5: FFS UE behaviour when request of leaving RRC Connected is triggred for MUSIM or Power saving, but there is an ongoing procedure for Power saving or MUSIM.**

Proponent’s comment for this open issue:

*What is the UE behaviour when request leaving of RRC connection has been initiated for MUSIM but requesting of leaving RRC Connection for power saving is triggered?*

*What is the UE behaviour when request leaving of RRC connection has been initiated for power saving but requesting of leaving RRC Connection for MUSIM is triggered?*

Companies’ views are summarized in table below:

|  |  |
| --- | --- |
| **Source** | **Related proposals** |
| Samsung, R2-2202240 | **Proposal 3: RAN2 does not specify any UE behavior on the interaction between power saving and MUSIM for leaving RRC connection.**  |
| Huawei, R2-2202698 | The scenario is a corner case and does not need to be specified. UE implementation can handle this. |
| Sharp, R2-2202768 | **Observation 1 The request of leaving RRC\_CONNECTED procedure for power saving purpose and for MUSIM are independent.****Observation 2 For the request of leaving RRC\_CONNECTED procedure for power saving, network may not release the RRC connection and UE will not release the RRC connection until a RRCRelease message is received.****Observation 3 For the request of leaving RRC\_CONNECTED procedure for MUSIM, UE will release the RRC connection when the configured timer T3xx expires.** **Observation 4 The request of leaving RRC\_CONNECTED procedure for MUSIM can be initiated when there is an on-going request of leaving RRC\_CONNECTED procedure for Power saving.****Observation 5 The request of leaving RRC\_CONNECTED procedure for power saving can also be initiated when there is an on-going request of leaving RRC\_CONNECTED procedure for MUSIM.****Proposal 1 The request of leaving RRC\_CONNECTED procedure for MUSIM should be initiated even if UE has already initiated the request of leaving RRC\_CONNECTED procedure for power saving.****Proposal 2 The request of leaving RRC\_CONNECTED procedure for power saving should not be initiated if UE has already initiated the request of leaving RRC\_CONNECTED procedure for MUSIM.** |

Two companies think how to handle the scenario doesn't need to be specified. And 1 company thinks this scenario needs to be addressed.

In the rapporteur’s understanding, the issue related to an optimization and is not critical to be addressed in this release. Hence, no proposal is made here.

**OI2-6: Whether busy indication is supported by network or not should be indicated to UE?**

Proponent’s comment for this open issue:

*After UE B receives paging from network B, the UE B would like to reject the paging and transmit busy indication to network B. However, the UE B is not aware of whether the serving cell supports busy indication or not. Therefore, the network B needs to indicate UE whether busy indication is supported or not via system information.*

Companies’ views are summarized in table below:

|  |  |
| --- | --- |
| **Source** | **Related proposals** |
| Lenovo, R2-2202573 | Observation 2: The UE will trigger busy indication procedure to the gNB even the serving gNB does not support busy indication.Proposal 4: Network needs to indicate UE whether busy indication is supported or not via broadcasting signalling. |
| Huawei, R2-2202698 | Busy indication (or Reject Paging) belongs to NAS UE capabilities for the MUSIM features. UE AS can get the information from UE NAS if CN supports Busy Indication or not. Hence there is no need to define any new signalling.  |
| LG, R2-2203416 | **Proposal 1. The network, i.e. gNB, doesn’t need to indicate whether to support a busy indication for MUSIM UE.****Proposal 2. The network ensures that SIM leaving procedure must be initiated without additional DL data after the reception of a NAS level busy indication.****Proposal 3. NAS level busy indication procedure can be performed by AS scheduling gap.**  |

One company think gNB needs to indicate UE whether busy indication is supported or not via broadcasting signalling. While two companies don’t think so. And the main argument is UE AS can get the information from UE NAS if CN supports Busy Indication or not.

The rapporteur share the same understanding with the opponent companies, and prefer no introduce AS indication for busy indication supporting. No proposal is made here.

# Conclusions

It is proposed to discuss and decide on the following proposals:

Switching procedure without leaving RRC\_CONNECTED

**Proposal 1: Introduce gap ID in RRCReconfiguration message for MUSIM to identify each configured gap, and support modification or release of configured gaps via gap ID. And adopt the list with ToAddModList/ToReleaseList in RRCReconfiguration for the scheduling gap configuration**

**Proposal 2: If the UEAssistanceInformation does not include a field for MUSIM gap preference, it indicates no preference for the corresponding field for MUSIM gap.**

**Proposal 3: The prohibit timer range is {0s, 0.5s, 1s, 2s, 3s, 4s, 5s, 6s, 7s, 8s, 9s, 10s, 20s, 30s}.**

Switching procedure with leaving RRC\_CONNECTED

**Proposal 4: *musim-LeaveAssistanceConfig* is optional. *musim-LeaveWithoutResponseTimer* is mandatory in *musim-LeaveAssistanceConfig*. The present of *musim-LeaveAssistanceConfig* indicates that UE is configured to provide MUSIM assistance information for leaving RRC\_CONNECTED.**

**Proposal 5: The value range of *musim-LeaveWithoutResponseTimer* for leaving RRC Connection state is defined as {10ms, 20ms, 40ms, 60ms, 80ms, 100ms}.**

**Proposal 6: The preferred RRC state indicator for switching notification with leaving RRC Connected includes state {RRC\_IDLE, RRC\_INACTIVE, outOfConnected}**

**Proposal 7: While the wait timer for switching notification to leave RRC connected state is running, the UE is not required to detect RLF or initiate connection re-establishment procedure. No SPEC change is needed.**

**Proposal 8: While the wait timer for switching notification to leave RRC connected state is running, the UE is not required to trigger CHO and may not perform handover command. No SPEC change is needed.**

**Proposal 9: RAN2 does not specify additional UE behavior on receiving reconfiguration of wait timer while wait timer is running.**

UE capabilities and other aspects

**Proposal 10: UE stores *musim-GapAssistanceConfig, musim-LeaveAssistanceConfig* and *musim-GapConfig* when entering RRC\_INACTIVE state. Upon initiation of RRC connection resume, the UE releases *musim-GapAssistanceConfig* from the UE Inactive AS context.**

**Proposal 11: Upon initiation of RRC connection re-establishment, the UE releases *musim-GapAssistanceConfig* and *musim-LeaveAssistanceConfig*, if configured.**

**Proposal 12: Upon reception of the RRCReestablishment message, the UE releases the gap configuration indicated by the *musim-GapConfig*, if configured.**

# References

1. RAN2#116bis-e Chair Notes.
2. R2-2202963 [Post116bis-e][202][MUSIM] Open issues for MUSIM (vivo) vivo
3. R2-2201706 [AT116bis-e][231][MUSIM] MUSIM gap details (vivo)
4. R2-2201707 [AT116bis-e][232][MUSIM] MUSIM configured time for leaving RRC connection (MediaTek)
5. R2-2202962 Capture RAN2 agreements on RRC for MUSIM vivo(Rapporteur) CR Rel-17 38.331 16.7.0
6. R2-2202964 Remaining issue on network switching, vivo discussion Rel-17 LTE\_NR\_MUSIM-Core
7. R2-2202206 Remaining Key Issues for MUSIM Gap OPPO discussion Rel-17 LTE\_NR\_MUSIM-Core
8. R2-2202207 Remaining Key Issues for Leaving Connected Mode OPPO discussion Rel-17 LTE\_NR\_MUSIM-Core
9. R2-2202240 Finalizing NW switching with leaving from RRC\_CONNECTED Samsung Electronics Co., Ltd discussion Rel-17 LTE\_NR\_MUSIM-Core
10. R2-2202254 Discussion on UE requested MUSIM gap release Samsung Electronics Co., Ltd discussion Rel-17 LTE\_NR\_MUSIM-Core
11. R2-2202419 Remaining issues about UE indication on switching Spreadtrum Communications discussion Rel-17
12. R2-2202517 Open Issues in MUSIM Network Switching Apple discussion Rel-17 LTE\_NR\_MUSIM-Core
13. R2-2202518 Miscellaneous Issues in MUSIM Apple discussion Rel-17 LTE\_NR\_MUSIM-Core
14. R2-2202573 Remaining issues for switching notification and busy indication Lenovo, Motorola Mobility discussion Rel-17
15. R2-2202645 Open issues on Network switching and Gap release signalling Intel Corporation discussion Rel-17 LTE\_NR\_MUSIM-Core
16. R2-2202698 Remaining issues for NW switching without leaving RRC\_CONNECTED Huawei, HiSilicon discussion Rel-17
17. R2-2202699 Remaining issues for NW switching with leaving RRC\_CONNECTED Huawei, HiSilicon discussion Rel-17
18. R2-2202740 On remaining issues for MUSIM Gap configuration Nokia, Nokia Shanghai Bells discussion Rel-17
19. R2-2202741 On remaining issues for switching notification for leaving RRC connection Nokia, Nokia Shanghai Bells discussion Rel-17
20. R2-2202768 RRC Connection release request procedure for MUSIM and power saving Sharp discussion R2-2201216
21. R2-2202770 Stop using of MUSIM Gap requested to be released Sharp discussion
22. R2-2202833 Remaining issues of Network switching for MUSIM China Telecom discussion Rel-17 LTE\_NR\_MUSIM-Core
23. R2-2202844 Interaction between NAS and AS for network switching ASUSTeK discussion Rel-17 36.304 LTE\_NR\_MUSIM-Core
24. R2-2202845 Configured time for network switching ASUSTeK discussion Rel-17 38.331 LTE\_NR\_MUSIM-Core
25. R2-2202856 Remaining issues on MUSIM gap configuration LG Electronics discussion Rel-17 LTE\_NR\_MUSIM-Core Withdrawn
26. R2-2202880 Consideration on the Remaining Issues of the Scheduling Gap ZTE Corporation, Sanechips discussion Rel-17 LTE\_NR\_MUSIM-Core
27. R2-2202925 Remaining issue for NW switching with leaving RRC\_CONNECTED MediaTek Inc. discussion
28. R2-2202938 Remain issues for network switching with leaving RRC\_CONNECTED SHARP Corporation discussion R2-2201228
29. R2-2203227 Remaining issues on MUSIM gap configuration LG Electronics France discussion Rel-17 LTE\_NR\_MUSIM-Core
30. R2-2203415 Remaining Issues on Switching with RRC Release LG Electronics discussion Rel-17 LTE\_NR\_MUSIM-Core
31. R2-2203416 Considerations on Busy Indication LG Electronics discussion Rel-17 LTE\_NR\_MUSIM-Core R2-2201577
32. R2-2203434 Remaining discussion on switchover procedures Ericsson discussion
33. R2-2203440 Corrections to the NR RRC CR for MUSIM (38.331) Ericsson draftCR Rel-17 38.331 16.7.0 F LTE\_NR\_MUSIM-Core