**3GPP TSG-RAN WG2 Meeting #117-e draft R2-2203664**

**Online, February 21 – March 3, 2022**

**Agenda item: 8.3.3**

**Source: Samsung**

**Title: Report of [AT117-e][232][MUSIM] Remaining details of MUSIM network switching (Samsung)**

**Document for: Discussion & Decision**

# 1 Introduction

This document is intended to address remaining MUSIM network switching open issues as per the following email discussion guidelines:

* [AT117-e][232][MUSIM] Remaining details of MUSIM network switching (Samsung)

      Scope: Discuss MUSIM network switching based on [R2-2202240](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_117-e/Docs/R2-2202240.zip). Discuss the value ranges of MUSIM UAI prohibit timer and musim-LeaveWithoutResponseTimer. Can also discuss other remaining critical open issues for MUSIM NW switching.

      Intended outcome: Discussion report in [R2-2203664](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_117-e/Docs/R2-2203664.zip).

      Deadline: Deadline 4 (Monday W2, 1200 UTC for comments)

# 2 Contact information

|  |  |
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# 3 Discussion

### 3.1 Clarification on initiation of UAI procedure for RRC\_CONNECTED

In [1], the following proposal is made:

**Proposal 1: Clarify in the specification that the UE is allowed to report its preferred RRC state to network for MUSIM purpose once since it was configured to provide MUSIM assistance information for leaving RRC\_CONNECTED.**

According to [2], the UE is allowed to initiate transmission of the UAI message multiple times whenever the UE needs to leave RRC\_CONNECTED if configured i.e. UAI procedure may be initiated again due to other UAI features

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, if configured, with the timer value set to the *musim-LeaveWithoutResponseTimer*;

Thus, the main intent of Proposal 1 is to clarify whether UE can re-transmit UAI messages including *musim-PreferredRRC-State* while the MUSIM leave without response timer is running. Note that the TP is provided for your reference reflecting this meeting agreement (e.g. make the MUSIM leave without response timer mandatory):

1. if configured to provide MUSIM assistance information for leaving RRC\_CONNECTED and timer T3xx is not running:

2> if the UE needs to leave RRC\_CONNECTED state:

3> start the timer T3xx with the timer value set to the *musim-LeaveWithoutResponseTimer*;

3> initiate transmission of the UEAssistanceInformation message in accordance with 5.7.4.3 to provide MUSIM assistance information for leaving RRC\_CONNECTED;

**Q1: Do you agree the UE is allowed to report its preferred RRC state to network for MUSIM purpose once since it was configured to provide MUSIM assistance information for leaving RRC\_CONNECTED?**

|  |  |  |
| --- | --- | --- |
| Company | Agree/disagree | Comments (if any) |
| OPPO | See comments | Actually, the question is out of sync with the proposed TP above. Directly asking whether to agree the proposed TP may be more suitable.Rapp: Sorry for confusion if any. The intent is to ask whether UE can send another UAI after sending UAI including musim-PreferredRRC-state. If agreeable, Rapp think addition of ' and timer T3xx is not running' is aligned with Q1 as our agreement makes this timer mandatory. Anyway as indicated above, the TP is provided just for information and the exact wording can be polished during specification impl. phase ☺ Regarding the TP above, we slightly share different view and propose the following:1. if configured to provide MUSIM assistance information for leaving RRC\_CONNECTED:

2> if the UE needs to leave RRC\_CONNECTED state for MUSIM purpose:3> initiate transmission of the UEAssistanceInformation message in accordance with 5.7.4.3 to provide MUSIM assistance information for leaving RRC\_CONNECTED;3> start the timer T3xx with the timer value set to the *musim-LeaveWithoutResponseTimer*; It’s not a common case for MUSIM UE to send MUSIM assistance information for leaving RRC\_CONNECTED again while the MUSIM leave without response timer is running, anyway UE is leaving. |
| Huawei/HiSilicon | Agree with comments | While the timer musim-LeaveWithoutResponseTimer is running, UE should not send the UAI message to leave RRC\_CONNECTED again.For the TP above, the timer should be started after initiaing the transmission of UAI. As the condition includes “and timer T3xx is not running”, it will not lead to multiple tranmissions of UAI message. Modified TP to:1. if configured to provide MUSIM assistance information for leaving RRC\_CONNECTED ~~and timer T3xx is not running~~:

2> if the UE needs to leave RRC\_CONNECTED state and timer T3xx is not running:~~3> start the timer T3xx with the timer value set to the~~ *~~musim-LeaveWithoutResponseTimer~~*~~;~~3> initiate transmission of the UEAssistanceInformation message in accordance with 5.7.4.3 to provide MUSIM assistance information for leaving RRC\_CONNECTED;3> start the timer T3xx with the timer value set to the *musim-LeaveWithoutResponseTimer*;Rapp: 1) On where to add 'and timer T3xx is not running', we are fine with Huawei's suggestion but we just provided it as same as UAI power saving feature i.e. 1> if configured to provide its release preference and timer T346f is not running:2) On when to start the timer: If you look at other UAI features, UE starts timer before executing "initiate transmission of the UAI message …." so Rapp understands there seems no need to deviate from existing procedure. |
| MediaTek | Question is different from TP | While wait timer is running, UE should not send another UAI for leaveing CONNECTED mode but we wonder do we really need to specify this. Anyway, we would prefer HW’s TP to have condition as below (if needed)2> if the UE needs to leave RRC\_CONNECTED state and timer T3xx is not running:Putting the start timer clause before or after the “initiate transmission of the UEAssistanceInformation……” does not really make too much difference in our view. Either way should be fine. |
| Qualcomm | Comment | No need to specify this as it is a very unlikely case, the NW can ignore it anyway, and we also have prohibit timer on top. If the majoriy really wants this, HW TP is fine.Rapp: We have separate procedure text for leaving and without leaving in the endorsed CR R2-2202962 i.e. prohibit timer is only applied to switching procedure without leaving. |
| Charter Communications | See comment | Agree with OPPO and QC that this is an unlikely case and need not be specified. |
| Intel | See comment | As others also commented, it is not essential to specify this. If needed, HW text is acceptable. We also agree with MediaTek that it doesn’t matter in terms of UE behaviour whether the timer is started before after. The statement is only about delivering the message to lower layers and not about actual transmission. |
| Sharp | See comment | Same view as Media Tek, we prefer Huawei’s TP to have condition as below, which can avoid UE to initiate another RRC\_Connected leaving procedure with minor update:2> if the UE needs to leave RRC\_CONNECTED state and timer T3xx is not running: |
| Samsung | Agree | We do not think it is an unlikely case as other UAI features can be triggered in any time so it would be good to confirm UE behavior. To achieve it, we think 'and timer T3xx is not running' is the main intent of this question considering our agreement to make the timer mandatory. The TP is provided just for information so if companies have strong concerns it can be polished during specification implemention phase.  |
| ZTE | Agree with the intention | We agree with the intention. For the details we agree with Samsung that it can be further polished during specification implementation phase based on companies comments. |
| DENSO |  | If RAN2 needs to specify the UE behavior in this case, Huawei’s text is fine. We also think it doesn’t matter whether timer is started before or after. |

Summary:

### 3.2 Condition of stopping the MUSIM leave without response timer

In [1], the following proposal with the corresponding TP is provided:

**Proposal 2: UE stops the configured wait timer (e.g. *musim-LeaveWithoutResponseTimer*), if running if *musim-LeaveAssistanceConfig* is set to release.**

1. if the received *otherConfig* includes the *musim-LeaveAssistanceConfig:*

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

1. consider itself to be configured to provide MUSIM assistance information for leaving RRC\_CONNECTED in accordance with 5.7.4:

2> else:

1. consider itself not to be configured to provide MUSIM assistance information for leaving RRC\_CONNECTED in accordance with 5.7.4 and stop the timer T3xx, if running:

**Q2: Do you agree the UE stops the MUSIM leave without response timer, if running if *musim-LeaveAssistanceConfig* is set to *release*?**

|  |  |  |
| --- | --- | --- |
| Company | Agree/disagree | Comments (if any) |
| OPPO |  | We can understand the intention, but still think this is a minor optimization. If musim-LeaveAssistanceConfig is set to release, that means leaving function is disabled, so whether the wait timer is running or not does not matter. Even the wait timer keeps running and expires, UE will still not go to idle autonomously as the musim-LeaveAssistanceConfig is set to release, i.e. the wait timer is not useful when musim-LeaveAssistanceConfig is set to release. |
| Huawei/HiSilicon | Please see comments | This seems a corner case and we don’t want to specify. If UE wants to leave NW A and the timer is running, what’s the UE behavior if UE stops the timer? Will the UE not move to NW B? If so this is not the intended behavior for the UE. |
| MediaTek | Disagree | The wait timer is about 100ms so pecificration during wait timer is really a corner case, we don’t have to pecific this kind of UE behavior.While UE has to leave NW A, it will leave anyway. Stop the timer here implies that the UE leave NW A earlier. |
| Qualcomm | Disagree | Agree with MTK. |
| Charter Communications | Disagree |  |
| Intel | Disagree | Agree with others that we do not need to specify this corner case. We do not need to support a case where network could use this reconfiguration to prevent UE from leaving connected after wait timer has started. And the possibility of a collision of messages is very remote. |
| Sharp | Disagree | Agree with MediaTek that it is a coner case and we do not think there is any critical issue in current running CR.  |
| Samsung | Agree | We would like to highlight two parts: 1) If the received *otherConfig* includes any UAI feature related with timer and it is set to *release*, existing procedure text specifies that UE stops timer, if running i.e. 1> if the received *otherConfig* includes the *delayBudgetReportingConfig*:2> if *delayBudgetReportingConfig* is set to *setup*:3> consider itself to be configured to send delay budget reports in accordance with 5.7.4;2> else:3> consider itself not to be configured to send delay budget reports and stop timer T342, if running.We believe that it is exactly aligned with our agreement i.e. 9: RAN2 does not specify additional UE behavior on receiving reconfiguration of wait timer while wait timer is running. UE starts/stops/restarts the timer as per legacy procedures for UAI transmission,2) We understand whether to leave RRC connection is totally up to NW decision. So it is not clear why NW is not allowed for UE to stay RRC\_CONNECTED regardless of it is corner case or not. |
| ZTE | See comments | So does it mean that the network can prevent the UE from leaving when the Network has received the UAI for the leaving? As network vendor, we don’t have strong view on this. |
| Lenovo | Agree | We are fine to align with the current text similar to T342. |
| DENSO |  | Agree with OPPO. |

Summary:

### 3.3 Value ranges of MUSIM UAI prohibit timer and musim-LeaveWithoutResponseTimer

RAN2 made the following agreements on the value ranges of MUSIM related timers

Timer value ranges (discussion postponed in 1st week Monday session)

* 3: The prohibit timer range is {0s, 0.5s, 1s, 2s, 3s, 4s, 5s, 6s, 7s, 8s, 9s, 10s}. We aim to add some smaller values (e.g. <0.5s, FFS which) during this meeting.
* Discuss the above FFS via offline [232]
* 5: The value range of musim-LeaveWithoutResponseTimer for leaving RRC Connection state is defined as {10ms, 20ms, 40ms, 60ms, 80ms, 100ms, spare2, spare1}. FFS if we define values for the spares (can be discussed during this meeting)
* Discuss the above FFS via offline [232]

Regarding the value range of musim-LeaveWithoutResponseTimer, up to 2 more values can be added without additional signalling overhead. It may be beneficial to define two spare values to be used if needed in the future.

**Q3: Do you agree to define two spare values in musim-LeaveWithoutResponseTimer?**

|  |  |  |
| --- | --- | --- |
| Company | Agree/disagree | Comments (if any) |
| OPPO | Agree |  |
| Huawei/HiSilicon | Disagree | The longer values increase the latency for the activities to be performed in NW B. Hence there is not need for spare values. |
| MediaTek | Disagree, but | But acceptable if majority prefers.We don’t really think the feature will be updated in the near release. It is kind of redundant to have spare values. |
| Qualcomm | Comment | It is better to use the remaining values since we will use 4 bits anyway for the signaling. It can fine to have two new values and two spare values, in case we see issues in the field in the future and add new values. |
| Charter Communications | Agree |  |
| Intel | Agree with comments | We also agree with comments from others that longer values are not useful and also updating the feature in the future is unlikely. But, we also see no harm in having the spare values – could help with ASN1 if at all it is indeed increased in a later release. |
| Samsung | Agree | We understand that defining spare values does not necessarily mean we will introduce longer values.  |
| ZTE | Agree |  |
| Lenovo | Agree |  |
| DENSO | Agree | Longer values seem to be not useful so far, but having spare values is OK since there is no signaling overhead.  |

Based on summarized companies's views [3], it is observed that only two companies mentioned smaller values on the prohibit timer range (i.e. 0.4s and less than 0.32s). Considering up to 4 more values can be added, it is not sufficiently clear which exact values are to be added. The rapporteur thinks that the simplest approach might add 0.1s, 0.2s, 0.3s, 0.4s or add two exact values (0.125s, 0.25s) while defining two spare values.

**Q4: Do you have any suggestions/preferences on what smaller values (e.g. <0.5s) to be added for the prohibit timer range?**

|  |  |  |
| --- | --- | --- |
| Company | Values of the prohibit timer (e.g. 0.4s…) | Comments (if any) |
| OPPO | No strong view | Adding 0.1s, 0.2s, 0.3s, 0.4s may be simper. |
| MediaTek | No strong view | Either (0.1s, 0.2s, 0.3s, 0.4s) or (0.125s, 0.25s) is fine to us |
| Qualcomm | Comment | 0.1s and 0.2s would be good. If the UE needs to leave, it is usually for something urgent on the other link, e.g. a voice call so smaller latency is beneficial. Most networks should be able to send a response in 100ms, if not sooner. |
| Intel | No strong view | Prohibit timer should only impact need for gap in connected. That should not change that frequently.  |
| Samsung | No strong view | Including 0.1s, 0.2s, 0.3s, 0.4s is simpler.  |

Summary:

### 3.4 FFS how to handle aperiodic gap configurations

RAN2 made the following agreements on scheduling gap configuration.

* 1: Introduce gap ID in RRCReconfiguration message for MUSIM to identify each configured periodic 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. FFS how to handle aperiodic gap configurations.

- Samsung agrees with intent of P1 but would like to clarify whether NW can change any parameters different from UE preference. Chair clarifies this is handled separately.

- Intel thinks the gap ID was intended for release request but is fine with it.

- ZTE wonders if this also applies for aperiodic gap? vivo clarifies this was for periodic gaps only.

- Apple wonders if this means we will have only two gaps configured?

- Samsung thinks we agreed earlier (RAN2#115e) that aperiodic gaps can be released by network.

During online discussion some companies raised the question whether both periodic and aperiodic gap configuration need to use common ToAddModList/ToReleaseList in RRCReconfiguration message. The rapporteur understands that one of main reasons on use of ToAddModList/ToReleaseList is to release the list elements from the list efficiently via the identities (e.g. gap ID). Thus, rapporteur would like to discuss first whether network is NOT allowed to explicitly release configured aperiodic gap (since it is one-shot configuration).

**Q5: Which of the following options do you agree for release of aperiodic gap configuration?**

* **Option 1: Network is allowed to release configured aperiodic gap**
* **Option 2: Network is NOT allowed to release configured aperiodic gap i.e. aperiodic gap is released implicitly after the gap period is over**

|  |  |  |
| --- | --- | --- |
| Company | Option 1/ Option 2 | Comments (if any) |
| OPPO | Option2 | Option2 is straightforward considering aperiodic gap is one-shot configuration |
| Huawei/HiSilicon | Option 2 | Since aperiodic gap is one-shot, it’s released implicity after the gap period is over. |
| MediaTek | Option 2 |  |
| Qualcomm | Option 2 | The only use case for Option 1 is if NW changes its mind after configuration but before the gap happens, which is very unlikely. |
| Charter Communications | Option 2 |  |
| Intel | Option 2 |  |
| Sharp | Option 2 | Aperiodic gap is used only once, it is a signalling efficient way to release it implicitly after the the gap period is over. |
| Samsung | Prefer Option 1 | We tend to agree with companies' views expressed so far, but at least it would be good for NW to release it from a specification point of view to address Q's comment.  |
| ZTE | Both option 1 and 2 are acceptable to us | There may be some cases that the UE doesn’t need to received the on-demand SI(though the network has assigned the gap) anymore(e.g. reselect to other cell). Anyway, both option 1 and 2 are acceptable to us |
| Lenovo | Option 2 |  |
| DENSO | Option 2 | Agree with Qualcomm and Sharp. |

If we go for Option 2, then it seems straightforward to introduce separate field or IE for aperiodic gap configuration. Otherwise, there seems no critical issue to use the common design for both periodic and aperiodic gap configuration i.e. ToAddModList/ToReleaseList.

**Q6: Which of the following options do you prefer for handling of aperiodic gap configuration in RRCReconfiguration message from ASN.1 perspective?**

* **Option 1: Use the common list with ToAddModList/ToReleaseList for periodic and aperiodic gap configuration**
* **Option 2: Introduce separate field or IE for aperiodic gap configuration**
* **Option 3: Others**

|  |  |  |
| --- | --- | --- |
| Company | Preferred option | Comments (if any) |
| OPPO | Option2 |  |
| Huawei/HiSilicon | Option 2 | The configuration from NW for aperiodic gap could just to indicate to the UE whether the apriodic gap is allowed or not. So, we think a separate IE can be introduced for aperiodic gap configuration. This would be efficient then using ToAddModList. |
| MediaTek | Option 2 |  |
| Qualcomm | Option 2 | This is cleaner from ASN.1 perspective |
| Charter Communications | Option 2 |  |
| Intel | Option 2. | It is one-shot and also the agreed addMod/Release structure for periodic gap doesn’t go well with one-shot aperiodic gap. |
| Sharp | Option 1/2 | No strong view, both option works. |
| Samsung | Option 3 | If we go for Option 1 in Q5, we prefer to go for Option 1 as itmakes the specification simpler. Otherwise, we are OK with Option 2.  |
| ZTE | Option 2 | Option 2 seems more clear |
| Lenovo | Option 2 |  |
| DENSO | Option 2 | The both options 1 / 2 can work, but separated field is preferred so that UE implementation can be simpler. |

Summary:

### 3.5 Remaining open issues in [Pre117-e][230]

The main intent of this section is to conclude some of remanining open issues (might impact specification) in [3] as much as possible in order not to further discuss them in future meetings.

#### 3.5.1 Whether busy indication is supported by network or not should be indicated to UE via broadcast signalling

In [3], it was discussed whether network needs to indicate UE whether busy indication is supported or not via broadcast signalling.

**Q7: Do you agree to introduce an indication in system information to indicate whether busy indication is supported or not?**

|  |  |  |
| --- | --- | --- |
| Company | Agree/disagree | Comments (if any) |
| OPPO | Disagree | Only NAS based busy indication is agreed for MUSIM and also a NAS indicator is already introduced in SA2 spec to indicate the feature, what’s the motivation and benefit to have AS indicator for busy indication? So, prefer not to have this indication in AS. |
| Huawei/HiSilicon | Disagree | It’s NAS capability and there is no need to indicate the support in system information. |
| MediaTek | Disagree | We don’t see the need for this. In addition, since it is NAS function, R2 should not discuss. |
| Qualcomm | Disagree |  |
| Charter Communications | Disagree |  |
| Intel | Disagree  |  |
| Sharp | Disagree | Considering that UE NAS has such information, it is a more efficient way for UE AS to get the information from UE NAS.  |
| Samsung | Disagree |  |
| ZTE | Disagree |  |
| DENSO | Disagree | No need to indicate the information in AS layer as busy indication is sent in NAS layer. |

#### 3.5.2 FFS UE behavior on the interaction between power saving and MUSIM

In [3], it was discussed when the request of leaving RRC\_CONNECTED procedure for MUSIM should (not) be initiated depending on the on-going leaving RRC\_CONNECTED procedure for power saving and vice versa.

**Q8: Do you agree that RAN2 does not specify any UE behavior on the interaction between power saving and MUSIM for leaving RRC connection i.e. no specification impact?**

|  |  |  |
| --- | --- | --- |
| Company | Agree/disagree | Comments (if any) |
| OPPO | Agree | We don’t see the strong motivation to consider the interaction. |
| Huawei/HiSilicon | Agree |  |
| MediaTek | Agree |  |
| Qualcomm | Agree |  |
| Charter Communications | Agree |  |
| Intel | Agree |  |
| Sharp | disagree | For power saving purpose, the NW will not release the RRC Connection even requested by UE if there is any DL data for the UE. So, in this case, if RRC\_Connected leaving procedure is triggered for MUSIM, UE should indicate to the NW regardless of the RRC\_Connected leaving procedure for power saving is on-going or not.For MUSIM purpose, the NW should release the RRC Connection if requested by UE. So, if RRC\_Connected leaving procedure for power saving is triggered when there is on-going RRC\_CONNECTED leaving procedure for MUSIM, it is a signalling efficient way to not initiate the procedure for that the RRC Connection anyway will be released.So, 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. |
| Samsung | Agree |  |
| ZTE | Agree |  |
| Lenovo | Agree |  |
| DENSO | Agree | It can be left up to good UE implementation. |

#### 3.5.3 FFS indication from UE in UAI on the criticality or need for the gap location to be maintained at the same position as requested

In [3], it was discussed on the need of additional indication (e.g.gap priority flag) in the MUSIM-GapInfo IE to address MUSIM gap configuration conflict with measurement gaps.

**Q9: Do you agree to introduce gap priority in the MUSIM-GapInfo IE?**

|  |  |  |
| --- | --- | --- |
| Company | Agree/disagree | Comments (if any) |
| OPPO |  | Totally a RAN4 issue, we can wait RAN4 progress if any. |
| Huawei/HiSilicon | Disagree | The motivation for the proposal in [3] was that it was discussed in RAN4. But as per our understanding, 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. |
| MediaTek | See comment | Suggest to discuss gap priority in gap coordination section. Not sure if any other additional indication is proposed but in general we think it is NOT necessary. |
| Qualcomm | Comment | Agree with MTK |
| Charter Communications | See comment | We agree with MTK that gap priority should be discussed in gap coordination section.  |
| Intel | See comment | RAN4 discussion or if anything needs to be discussed in RAN2, it should be in gap coordination section |
| Samsung | Disagree | We think it would be good to confirm it is not introduced from R2 perspective. |
| ZTE | See comment | We share the similar view as MTK |
| Lenovo | See comments | Agree with MTK |
| DENSO |  | Agree with Intel. We don’t need to discuss here. |

Summary:

### 3.6 Others

For any **critical** other issues not covered above, please feel free to indicate them into the following table.

|  |  |  |
| --- | --- | --- |
| Company | Discussion points | Comments  |
|  |  |  |
|  |  |  |

# 4 Conclusion

TBD

# 5 Reference

[1] R2-2202240, Finalizing NW switching with leaving from RRC\_CONNECTED, Samsung

[2] R2-2202962, Capture RAN2 agreements on RRC for MUSIM, vivo(Rapportuer)

[3] R2-2203635, [Pre117-e][230][MUSIM] Summary of Stage-3 details of MUSIM (vivo)