**3GPP TSG RAN meeting #101 RP-231817**

**Bangalore, India, September 11-15, 2023**

## Status Report to TSG

**Agenda item:** 9.3.2.3

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **WI / SI Name** | **Dual Transmission/Reception (Tx/Rx) Multi-SIM for NR** | | | | |
| included in this status report | Study Item:  No | Core part:  Yes | Performance part:  Yes | | Testing part:  - |
| **Acronym** | NR\_DualTxRx\_MUSIM | | | | |
| **Unique ID** | 941001 | | | | |
| **TSG Tdoc of latest approved WI/SI description (if any)** | RP-231461 | | | | |
| **Target Completion Date**  **(indicate if changed)** | Study Item: - | Core part: 12/2023 | Performance part:  06/2024 | Testing part: - | |
| **Overall Completion level** | Study Item: - | Core part:  Overall: 65% | Performance Part: -  Overall: 0% | Testing part: - | |

Note: Overall completion level percentage numbers should use one of the colors below:

* xx%: Normal progress, no RAN plenary action needed
* xx%: Progress behind schedule, may need RAN plenary intervention. If so, SR should clearly define requested action
* xx%: Progress critically behind, RAN plenary shall intervene. SR should define requested action

**Source:**

|  |  |  |
| --- | --- | --- |
| **Leading WG** | | RAN2 |
| **Rapporteur** | **Name** | Xiaodong Yang |
| **Company** | vivo |
| **Email** | Yangxiaodong5g@vivo.com |

## 1 Work plan related evaluation

|  |  |
| --- | --- |
| **Do you want to modify the time budget for this WI/SI compared to what was endorsed at the last RAN meeting?** |  |

*If you answered No: Then please remove the Excel file from the zip file of this status report.*

*If you answered Yes: Then please fill out the attached Excel template to request a modification of the time budgets for your WI /SI. The Excel table has to be filled out for all affected RAN WGs and up to the target date of the WI/SI. The basis are the endorsed time budgets of the last RAN meeting. Please highlight all changes of the values.  
 One time unit (TU) corresponds to ~ 2 hours in the meeting.  
 If this status report covers a WI with Core and Performance part, then please have one line for each in the attached Excel table.  
 Note: If no Excel table is attached, then this means no time budget change.*

## 2. Detailed progress in RAN WGs since last TSG meeting (for all involved WGs)

NOTE: Agreements and Open issues impacted cross-TSG aspects shall be explicitly highlighted

## 2.1 RAN1

#### 2.1.1 Agreements

#### 2.1.2 Remaining Open issues

## 2.2 RAN2

#### 2.2.1 Agreements

**RAN2 123**

**Temporary capability restriction**

* Use Msg5 for early indication of MUSIM capability restriction for UEs in IDLE.
* Using LCIDs would avoid any problems for RRC resume procedure. However, there are not many LCIDs left for UL and some other Rel-18 WIs also intend to use them.
* FFS whether there is a need to use the LCIDs or whether we can reuse the legacy LCIDs.
* Whether we can use the LCIDs (given that multiple WIs may be trying to use them) will be discussed in the main session. How to proceed LCID usage for MUSIM can be discussed in the next meeting based on the main session decision.
* 3: UE sends early indication of MUSIM temporary capability restriction only if the network indicates that it is allowed in SIB1.
* No support to use RRCReconfigurationComplete for the early indication of MUSIM capability restriction. Can come back if sufficient support.
* Continue discussion in Thursday session with proactive approach on whether UE can indicating frequency that it would prefer to use.
* Discussion was not continued due to lack of time. Post-meeting email discussion (long, vivo) on this topic.
* If a timer is introduced, RAN2 needs to define UE behaviour when timer expires and network response is not received. RAN2 also needs to define what “network response” means, i.e. is it a RRCReconfiguration message or a particular field or something else?
* FFS whether a timer is needed (e.g. to avoid UE from doing something while the network response has not yet arrived)
* Companies should provide Stage-3 details for the next meeting on UE behaviour when network does or does not respond to the UE request to restrict the capabilities due to MUSIM.
* 1: The UE can indicate that some frequencies (e.g. frequency ranges, bands or BCs) are impacted by NW B so that they are:

1) forbidden because of collision

2) having restricted (lower) capabilities (e.g. with lower MIMO layer).

* 4: The restrictions can apply to CA, DC and/or single CC.
* 5: The UL/DL MIMO layer and/or the UL/DL supported bandwidth restriction (if supported) shall only work for the restricted frequencies for the proactive case.
* 1 For dual active MUSIM, the UE can indicate the temporary maximum MIMO layers for specific serving cells for both UL and DL.
* FFS whether there is a use case for the UE to indicate the temporary supported channel bandwidth for specific serving cells.
* 3 Maximum MIMO layers/bandwidth restriction is reported per CC ((FFS how we signal this).
* FFS whether we support indicating temporary capability restrictions on SRS Tx switching capability. FFS whether this could be already indicated by the MIMO layer restrictions.

**R17 MUSIM Gap coordination**

* 1. When requesting periodic MUSIM gap(s), UE indicates priority values (using R17 IE definition) for all or a subset periodic MUSIM gaps.
* 2. When receiving priorities for periodic MUSIM gap(s), the UE may receive changed priority values. If network doesn’t retain the relative priorities among MUSIM gaps, UE behaviour is not specified.
* Send LS to RAN4 informing them of this agreement. Offline 203 (LGE).
* When a Rel-18 UE requests gap priorities for periodic MUSIM gaps, the UE shall always request priorities for all of its requested periodic MUSIM gaps. That means that UE requests the network of gap priority preferences for all of periodic MUSIM gaps using the existing R17 gap priority information (i.e. it cannot only include a subset). Include the agreement to the LS
* 1. When requesting periodic MUSIM gap(s), UE indicates priority values (using R17 IE definition) for all periodic MUSIM gaps.
* For the last sentence, use the wording “If network doesn’t configure the relative priorities among MUSIM gaps as indicated by the UE, UE behavior is not specified.”
* With the above changes, the LS is approved (unseen) in R2-2309008

#### 2.2.2 Remaining Open issues

1 detailed mechanism to indicate preference on temporary UE capability restriction in NW A for MUSIM purpose, e.g., how to indicate the frequency for proactive case. “Keep solution” for MUSIM gap signalling procedure.

2 stage 2 and stage 3 CR.

3 UE Capability definition and reporting for R18 MUSIM

## 2.3 RAN3

#### 2.3.1 Agreements

#### Remaining Open issues

## 2.4 RAN4

#### 2.4.1 Agreements

**RAN4 108**

**Issue 2-1-5: Priority setting for aperiodic MUSIM gaps**

Agreement

* + Aperiodic MUSIM gap is always kept (not dropped) from UE perspective in case of collisions with other gaps (i.e. all gaps including MUSIM gaps, MGs, etc)
  + The gap priority level is not explicitly configured by the NW

**Issue 2-2-1: Definition of the collision between different MUSIM gaps**

Agreement:

* The gap proximity condition for the Rel-17 concurrent gap collision will be reused for the collision between different MUSIM gap when priority rules are used to handle the collision between MUSIM gaps

**Issue 2-2-2-2: How to determine when “keep solution” is used based on UE request**

Agreements:

Introduce signalling to allow UE to request to use “keep solution” collision handling mechanism for requested aperiodic and periodic MUSIM gaps and network to grant UE the use of “keep solution”. The same request applies for all MUSIM gaps altogether (i.e. one bit indication). Signalling design is up to RAN2.

Agreement:

NW A sends feedback to UE to let UE know NW A’s decision on “keep solution” request

* Feedback signalling is up to RAN2 design.

**Issue 2-2-2-3: On “equal priority” for MUSIM gaps**

Agreement:

* “Equal priority” is not allowed (UE will not request equal priority and NW A will not allocate equal priority)

**Issue 2-2-4: UE behaviour when using “keep solution”**

Agreements:

When “keep solution” is used, the UE keep all colliding MUSIM gaps irrespective of the priority of the MUSIM gaps

**Issue 3-1-1: Principle on layer 1 and layer 3 measurement requirements after gap collision handling**

Agreements:

* + Reuse the same principle of Rel-17 concurrent gaps WI to define network A L1/L3 measurement requirements when MUSIM gaps are configured, i.e., introduce a scaling factor like Kx = Ntotal /Navailable for network A requirements when MUSIM gaps are configured.

#### 2.4.2 Remaining Open issues

1. Collisions between gaps and priority rules

2. On network A and network B requirements

## 3. Detailed progress in SA/CT WGs since last TSG meeting (for all involved WGs)

NOTE: This section only needs to be filled in for WI/SIs where there is a corresponding relevant WI/SI in SA/CT.

## 3.1 SAx/CTs

#### 3.1.1 Agreements with cross-TSG impacts

#### 3.1.2 Remaining Open issues with cross-TSG impacts

NOTE: This section should also flag any critical dependencies that need TSG attention.

## 4. RAN Plenary Intervention

## 5. References

NOTE: This can be e.g. a list of all related Tdocs in the affected WGs since last TSG, references to LSs, produced TRs/TSs, the work/study item description or status reports of previous TSGs.

**RAN2 #123**

R2-2307538 37.340 Running CR for Introduction of MUSIM ZTE Corporation, Sanechips draftCR Rel-18 37.340 17.5.0 B NR\_DualTxRx\_MUSIM-Core

R2-2307689 Running RRC CR for NR MUSIM enhancements vivo draftCR Rel-18 38.331 17.5.0 NR\_DualTxRx\_MUSIM-Core

R2-2308726 38.300 Running Stage-2 CR for NR MUSIM enhancements China Telecom draftCR Rel-18 38.300 17.5.0 NR\_DualTxRx\_MUSIM-Core

R2-2307161 Discussion on proactive and reactive approaches OPPO discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2307162 Discussion on early MUSIM Indication OPPO discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2307280 Procedures for MUSIM temporary capability restriction DENSO CORPORATION discussion NR\_DualTxRx\_MUSIM-Core

R2-2307450 Discussion on early MUSIM indication Huawei, HiSilicon discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2307454 Discussion on proactive and reactive approaches Huawei, HiSilicon discussion

R2-2307539 Consideration on the Temporary capability Reporting procedure ZTE Corporation, Sanechips discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2307690 Early indication for MUSIM temporary capability restriction vivo discussion Rel-18

R2-2307691 Procedures for MUSIM temporary capability restriction vivo discussion Rel-18

R2-2307774 Basic signalling procedure for reactive and proactive approach for Dual TX/TX MUSIIM operation Nokia, Nokia Shanghai Bell discussion

R2-2307775 Additional aspects for Dual TX/RX MUSIM Operation Nokia, Nokia Shanghai Bell discussion

R2-2307780 Indication of UE Capability Restriction for eMUSIM SHARP Corporation discussion

R2-2307872 Signalling aspects for MUSIM temporary capability restriction Apple discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2308089 Common framework for proactive and reactive approach for MUSIM Intel Corporation discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2308091 MUSIM Capability restriction signalling during RRC Resume and Setup Intel Corporation discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2308243 Discussion on early capability restriction indication NEC discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2308244 Procedures for MUSIM temporary capability restriction NEC discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2308255 Early indication of restricted capabilities for MUSIM UE Ericsson discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2308497 Early indication of temporary capability restriction Samsung discussion

R2-2308498 Discussion on temporary capability restriction Samsung discussion

R2-2308758 Procedure for MUSIM temporary capability restriction China Telecom discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2308787 General procedure for Both Proactive and Reactive cases LG Electronics discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2308788 Supporting Proactive cases in other scenarios LG Electronics discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2308789 Timer based approach in MUSIM LG Electronics discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2308791 Procedures for Dual-Active MUSIM Qualcomm Incorporated discussion

R2-2307163 Allowed MUSIM temporary capability restrictions OPPO discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2307451 Details of allowed MUSIM temporary capability restrictions Huawei, HiSilicon discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2307540 Consideration on the Temporory Capability Reporting ZTE Corporation, Sanechips discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2307598 Allowed MUSIM temporary capability restrictions Samsung R&D Institute India discussion

R2-2307678 Capability sharing issue for SRS Tx switching capability Xiaomi discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2307692 Discussion on temporary capability restriction for Rel-18 Multi-SIM vivo discussion Rel-18

R2-2307776 Analysis on capability restriction for Dual TX/RX MUSIM Operation Nokia, Nokia Shanghai Bell discussion

R2-2307873 Allowed MUSIM temporary capability restriction for band conflict mitigation Apple discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2308257 Discussion on frequencies restriction for MUSIM UE Ericsson discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2308258 Measurement gap capability for MUSIM UE Ericsson discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2307452 Discussion on MUSIM gap priority Huawei, HiSilicon discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2307541 Consideration on the MUSIM Gap Priority ZTE Corporation, Sanechips discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2307542 Consideration on the R17/18 MUSIM Feature interaction ZTE Corporation, Sanechips discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2307693 Discussion on MUSIM gap priorities vivo discussion Rel-18

R2-2307777 On MUSIM Gap Priority handling for Single RX MUSIM operation Nokia, Nokia Shanghai Bell discussion

R2-2308090 UAI repetition for MUSIM and dependency on Rel-17 MUSIM capability Intel Corporation discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2308256 MUSIM gap priority configuration Ericsson discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2308708 Further discussion on MUSIM gap priorities Samsung Electronics Nordic AB discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2308790 MUSIM Gap Priority LG Electronics discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2309001 [DRAFT] LS on MUSIM gap priorities LGE LS out Rel-18 NR\_DualTxRx\_MUSIM-Core To: RAN4

R2-2309008 LS to RAN4 on MUSIM gap priorities RAN2 LS out Rel-18 NR\_DualTxRx\_MUSIM-Core To: RAN4

**RAN4 #108**

R4-2311382 Discussion on general aspects of R18 MUSIM Apple

R4-2311383 Discussion on collisions between gaps and priority rules of R18 MUSIM Apple

R4-2311384 Discussion on network A requirements of R18 MUSIM Apple

R4-2311385 Discussion on network B requirements of R18 MUSIM Apple

R4-2311840 Discussion on Collisions between gaps and priority rules Xiaomi

R4-2311841 Discussion on network A requirements Xiaomi

R4-2311842 Discussion on network B requirements Xiaomi

R4-2311867 Discussion on collisions between gaps and priority rules China Telecom

R4-2311868 Discussion on network A requirements for MUSIM gaps China Telecom

R4-2311869 Discussion on network B requirements for MUSIM gaps China Telecom

R4-2311893 Discussion on collisions between gaps and priority rules for MUSIM gaps CMCC

R4-2311894 Discussion on network A requirements for MUSIM gaps CMCC

R4-2311895 Discussion on network B requirements for MUSIM gaps CMCC

R4-2311896 Discussion on open issues for MUSIM gaps CMCC

R4-2311977 On requirements for Rel-17 MUSIM gaps - Gap collisions Qualcomm Incorporated

R4-2311978 On requirements for Rel-17 MUSIM gaps - Network A requirements Qualcomm Incorporated

R4-2311979 On requirements for Rel-17 MUSIM gaps - Network B requirements Qualcomm Incorporated

R4-2312002 Discussions on general issues in MUSIM gaps Ericsson

R4-2312003 Discussions on collision between MUSIM gaps Ericsson

R4-2312004 Discussions on NW-A’s requirement in MUSIM gaps Ericsson

R4-2312005 Discussions on NW-B’s requirement in MUSIM gaps Ericsson

R4-2312077 Discussion on collisions between gaps and priority rules ZTE Corporation

R4-2312078 Discussion on Network A requirements ZTE Corporation

R4-2312298 Further considerations on issues for general aspects for MUSIM gaps vivo

R4-2312299 Further considerations on issues for collisions between gaps and priority rules for MUSIM gaps vivo

R4-2312300 Further considerations on issues for network A RRM requirements of MUSIM gaps vivo

R4-2312301 Further considerations on issues for network B RRM requirements of MUSIM gaps vivo

R4-2312302 LS on MUSIM gap collision handling vivo

R4-2312491 LS on MUSIM gap collision handling vivo

R4-2312675 Discussion on general RRM requirements for Rel-17 MUSIM gaps OPPO

R4-2312676 Discussion on collision between gap and priority rules OPPO

R4-2312677 Discussion on network A requirements OPPO

R4-2312831 Discussion on general issues related to MUSIM gaps Huawei, HiSilicon

R4-2312832 Discussion on collision handling for MUSIM gaps Huawei, HiSilicon

R4-2312833 Discussion on NW A requirements with MUSIM gaps Huawei, HiSilicon

R4-2312834 Discussion on NW B requirements with MUSIM gaps Huawei, HiSilicon

R4-2313361 General aspects Nokia, Nokia Shanghai Bell

R4-2313362 Collisions between gaps and priority rules Nokia, Nokia Shanghai Bell

R4-2313363 Network A requirements Nokia, Nokia Shanghai Bell

R4-2313364 Network B requirements Nokia, Nokia Shanghai Bell

R4-2313423 Discussion on the CR work split for Rel-18 MUSIM WI vivo

R4-2313716 Discussion on the general aspects of MUSIM gaps MediaTek inc.

R4-2313717 Discussion on RRM requirements for MUSIM gaps collision handling MediaTek inc.

R4-2313718 Discussion on NW A RRM requirements for MUSIM MediaTek inc.

R4-2313719 Discussion on NW B RRM requirements for MUSIM MediaTek inc.

R4-2313838 Discussion on collisions between gaps and priority rules of MUSIM Charter Communications, Inc

R4-2314170 Topic summary for [108][225] NR\_DualTxRx\_MUSIM Moderator (Vivo)

R4-2314369 Ad-hoc minutes for R18 MUSIM vivo

R4-2314364 WF on R18 MUSIM vivo

R4-2314465 LS on Dual Tx/Rx Multi-SIM MTK