3GPP TSG-RAN WG2 Meeting #124 R2-23xxxxx

Chicago, USA, Nov. 13th – 17th, 2023

Source: RAN2 Vice Chairman (CATT)

Title: Report from session on NR MIMO evolution and Multi-SIM

## Status of At-Meeting Email Discussions

This subclause is not an Agenda Item. It contains a running summary of the email discussions assigned to take place during the meeting weeks.

* [AT124][200] Organizational – NR MIMO evolution and Multi-SIM (RAN2 VC)

**Scope**:

* + - Share plans and list of ongoing email discussions for the related sessions
    - Share meetings notes and agreements for review and endorsement

## 7.17 Dual Transmission Reception (Tx Rx) Multi-SIM for NR

(NR\_DualTxRx\_MUSIM-Core; leading WG: RAN2; REL-18; WID: [RP-231461](http://ftp.3gpp.org/tsg_ran/TSG_RAN/TSGR_100/Docs/RP-231461.zip))

Time budget: 1 TU

Tdoc Limitation: 3 tdocs

### 7.17.1 Organizational

Rapporteur input (e.g., work plan, remaining open issue list), incoming LS etc.

Latest version running CRs submitted by the spec editors.

R2-2311844 Running RRC CR for NR MUSIM enhancements vivo draftCR Rel-18 38.331 17.6.0 NR\_DualTxRx\_MUSIM-Core Withdrawn

R2-2311933 Running RRC CR for NR MUSIM enhancements vivo CR Rel-18 38.331 17.6.0 4399 - B NR\_DualTxRx\_MUSIM-Core Withdrawn

CRs

R2-2311936 Introduction of NR MUSIM enhancements vivo CR Rel-18 38.331 17.6.0 4401 - B NR\_DualTxRx\_MUSIM-Core

R2-2312077 Introduction of R18 MUSIM UE Capabilities Huawei, HiSilicon CR Rel-18 38.331 17.6.0 4408 - B NR\_DualTxRx\_MUSIM-Core

R2-2312081 Introduction of R18 MUSIM UE Capabilities Huawei, HiSilicon CR Rel-18 38.306 17.6.0 0976 - B NR\_DualTxRx\_MUSIM-Core

R2-2313240 38.300 Running CR for NR MUSIM enhancements China Telecom Corporation Ltd. CR Rel-18 38.300 17.6.0 0741 - B NR\_DualTxRx\_MUSIM-Core

R2-2313330 37.340 running CR for introduction of DualTxRx\_MUSIM ZTE Corporation, Sanechips CR Rel-18 37.340 17.6.0 0373 - B NR\_DualTxRx\_MUSIM-Core

* ?? The above CRs are endorsed. Will be updated and reviewed in post meeting email discussion.

### 7.17.2 Procedures and signalling for MUSIM temporary capability restriction

Remaining aspects for the “proactive” and “reactive” procedures

Remaining signaling design details for the temporary capability restrictions.

Including email report of long email discussion [205].

Contributions on open issues addressed explicitly by the email discussion [205], should be avioded

Email discussion report

R2-2311845 [Post123bis][205][MUSIM] RRC Running CR and further discussions (vivo) vivo other Rel-18 NR\_DualTxRx\_MUSIM-Core

*MN-SN coordination*

*Proposal 1: [5/5The MN can indicate the forbidden band entries (for the MUSIM purpose) info to the SN. Detailed signaling FFS.*

*Proposal 3: [4/4] For the affected bands with restricted capabilities, the MN can also indicate the SN about the capability restriction info if the corresponding band is allowed for the SN.*

*Bandwidth restriction*

*Proposal 4: [6/7] To solve MUSIM band conflict issue, the UE can indicate the temporary supported channel bandwidth restriction.*

*Proposal 4a: [6/6] Following above ASN.1 coding as baseline for the temporary supported channel bandwidth restriction indication:*

*SCG/SCell release using SRB3*

*Proposal 5: [6/7] UE temporary capability restrictions indication of SCG/SCell release via SRB3 for MUSIM purpose is not supported in this release.*

*Gap priority “keep” solution configuration*

*Proposal 6: [6/7] After UE indicates its preference for gap priority “keep” solution option, NW can configure UE to use “keep” solution option or not.*

Early capability restriction indication

R2-2312154 Discussion on WA and Capturing Early indication for ResumeReq Intel Corporation discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

*Proposal #1: It is proposed to not agree the working assumption. Instead agree to provide the early indication for Resume procedure in msg 3.*

*Proposal #2: If proposal 1 is not agreed and the current working assumption is to be agreed instead, it is proposed to capture the UE behaviour with a NOTE as follows:*

*NOTE: If the UE is experiencing capability restriction due to MUSIM, UE may temporarily use a configuration different from the received configuration until receipt of the next message with new configuration. UE still considers the received configuration as the current configuration as the baseline for delta configuration for future reconfigurations.*

R2-2313350 Discussion on temporary capability restriction Samsung discussion Rel-18

*Proposal 6: A UE supporting R18 MUSIM temporary capability restriction does NOT go to RRC\_IDLE if it is temporary unable to apply (part of) the configuration included in the RRCResume message. It is up to UE implementation how to apply the configuration included in the RRCResume message.*

*Proposal 7: Add the following NOTE in clause of 5.3.13.11 of TS 38.331:*

*- NOTE: The UE supporting MUSIM temporary capability restriction does not apply above failure handling in case it does not apply any part of the configuration for MUSIM purpose. It is up to UE implementation how to apply it.*

MN-SN coordination, remaining aspects

R2-2313334 Consideration on the MN-SN Coordination for the MUSIM ZTE Corporation, Sanechips discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

*Proposal 1: The MN can indicate the forbidden band entries (for the MUSIM purpose) info to the SN by reusing the existing selectedBandEntriesMNList.*

R2-2311802 Procedures and signalling for MUSIM temporary capability restriction OPPO discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2311846 Discussion on the remaining issue of MUSIM temporary capability restriction vivo report Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2312303 Leftover issues on MUSIM temporary capability restriction Apple discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2312304 Clarification on the gap information reporting Apple discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2312305 Early MUSIM indication during RRC resume procedure Apple discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2312395 Discussion on solution of early indication of temporary capability restriction NEC discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2312430 Remaining consideration on MUSIM early indication DENSO CORPORATION discussion NR\_DualTxRx\_MUSIM-Core

R2-2312642 Discussion on remaining issues for temporary capability restriction Huawei, HiSilicon discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2312729 Discussion on MUSIM temporary capability restriction in NR-DC Huawei, HiSilicon discussion

R2-2312816 On some restricted capabilities for Rel-18 MUSIM UE Ericsson discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2312817 Indication of restricted capabilities at RRC Setup and Resume by MUSIM UE Ericsson discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2312818 Discussion on remaining open issues on capability restriction Ericsson discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2312862 Further analysis on signalling procedure for capability restriction Nokia, Nokia Shanghai Bell discussion

R2-2312863 Capability restriction for specific capabilities and Interworking issues with existing features Nokia, Nokia Shanghai Bell discussion

R2-2313064 Control signaling for Dual-Active MUSIM Qualcomm Incorporated discussion

R2-2313068 Early Indication in RRC Resume procedure LG Electronics discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2313069 Supporting Proactive cases in other scenarios LG Electronics discussion Rel-18 NR\_DualTxRx\_MUSIM-Core R2-2311098

R2-2313237 Procedure for MUSIM temporary capability restriction China Telecom Corporation Ltd. discussion

R2-2313289 Considerations on Wait Timer Configuration and Handling Samsung discussion Rel-18

R2-2313332 Consideration on the Reactive Procedure ZTE Corporation, Sanechips discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2313333 Consideration on the Temporory Capability Reporting ZTE Corporation, Sanechips discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2313386 Clarification on the wait timer for capability restriction Xiaomi discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2313387 Capability restriction for the proactive approach Xiaomi discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2313388 Required UE capability bits for Rel-18 MUSIM Xiaomi discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

### 7.17.3 Other

Other remaining aspects if not covered by the previous agenda items, including e.g., aspects related to the RAN4 agreements/reqeusts, if any, and UE capabilit(ies) for the MU-SIM feature(s).

UE capability aspects

R2-2312643 Discussion on MUSIM UE capabilities Huawei, HiSilicon, Nokia discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

*UE capability for MUSIM gap priority*

*Proposal 1: Reuse existing UE capability bit for MUSIM gap priority configuration and preference to indicate whether the UE supports providing the UE preference of “keep solution” in MUSIM assistance information.*

*UE capability for temporary capability restriction*

*Proposal 2: Introduce 1 optional per-UE capability bit without xDD/FRx differentiation to indicate whether the UE supports providing MUSIM assistance information with temporary capability restriction (i.e. not differentiate the capability to support proactive approach and reactive approach).*

*Proposal 3: The support of “early MUSIM indication” is defined as optional without capability signalling. UE supporting “early MUSIM indication” shall support MUSIM assistance information with temporary capability restriction.*

R2-2311847 Discussion on UE capability for MUSIM features vivo discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2311848 Discussion on MUSIM gap priorities vivo discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

R2-2312864 MUSIM Gap collision handling and MUSIM capability interactions Nokia, Nokia Shanghai Bell discussion

R2-2313420 Further discussion on UE capabilities and MN-SN coordination Samsung discussion Rel-18 NR\_DualTxRx\_MUSIM-Core

## 7.20 NR MIMO evolution

(NR\_MIMO\_evo\_DL\_UL-Core; leading WG: RAN1; REL-18; WID: [RP-223276](http://ftp.3gpp.org/tsg_ran/TSG_RAN/TSGR_98e/Docs/RP-223276.zip))

Time budget: 0.75 TU

Tdoc Limitation: 3 tdoc

### 7.20.1 Organizational

Rapporteur input (e.g., work plan, open issue list), incoming LS etc.

Latest verison of running CRs submitted by the spec rapporteurs.

Including report from long email discussion [203] and [204].

CRs

R2-2313417 Introduction of 2-TA enhancement NTT DOCOMO, INC. CR Rel-18 38.300 17.6.0 0742 - B NR\_MIMO\_evo\_DL\_UL-Core

R2-2311976 Introduction of Rel-18 MIMO for TS 38.321 Samsung CR Rel-18 38.321 17.6.0 1696 - B NR\_MIMO\_evo\_DL\_UL-Core

R2-2312045 Introduction of MIMO Evolution Ericsson CR Rel-18 38.331 17.6.0 4406 - B NR\_MIMO\_evo\_DL\_UL-Core

* ?? The above CRs are endorsed. Will be updated and reviewed in post meeting email discussion.

Open issue list from WI Rapp

R2-2313423 Remaining open issue list for MIMO evolution NTT DOCOMO, INC. discussion Rel-18

* ?? Noted

Other aspects

R2-2312563 Copy of R1-2310692 Consolidated\_Rel-18\_higher\_layer\_parameters\_list Ericsson discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

* ?? Noted

Email discussion report

R2-2312101 report of [Post123bis][203][MIMOevo] MAC remaining issues Samsung discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

*Proposal 1: (9/11) For inter-cell PDCCH order, use the R bit in RAR to indicate TAG, i.e., same as intra-cell PDCCH order CFRA.*

*Proposal 2: (10/11) RRC configures the association between TAG ID and 1st/2nd TAG in RAR. FFS a RRC parameter to indicate the association.*

*Proposal 3: Discuss if 2TAG configuration for multi-TRP operation is released when initiating RRC resume and TAG indication in successRAR is not needed.*

*Proposal 4: (11/11) RACH configuration for the additionalPCI shall only be used for inter-cell PDCCH ordered CFRA, i.e., not used for UE initiated RACH.*

*Proposal 5: (8/11) If the MTTD between a STAG and a PTAG is exceeded, UE considers the TAT of a STAG (up to UE implementation) as expired and stops UL transmission associated to the STAG. FFS for MTTD between two STAGs whether both or any one STAG is considered as expired.*

*Proposal 6: (8/11) If the MTTD between PTAGs in different MAC entities is exceeded, the TAT of any PTAGs is not considered as expired.*

*Proposal 7: FFS if the MTTD between PTAGs in one MAC entity is exceeded, UE considers the TAT of a PTAG (up to UE implementation) as expired and stops UL transmission associated to the PTAG. FFS LS to RAN4.*

*Proposal 8-1 : FFS whether the coexistence of deactivated SCG and multi-TRP is supported in R18.*

*Proposal 8-2: (9/11) If the coexistence of deactivated SCG and multi-TRP is supported in R18, if two PTAGs are configured for the PSCell, indicate to uppler layers that RA is needed for SCG activation if TATs of both PTAGs are not running.*

*Proposal 9: (10/11) HARQ ACK is not generated if the TCI state to be applied for the HARQ feedback transmission is associated to a TAG with TAT expired.*

R2-2312552 Report of Post 123bis MIMOevo RRC Ericsson report Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

*Proposal 1 Discuss on RAN2#124 on LS need and content*

*Proposal 2 RAN2 to adopt as content for RACH configuration per additionaPCI(7 of these) IE RACH-ConfigGeneric, ssb-perRACH-Occasion and prach-RootSequenceIndex*

*Proposal 3 RAN2 extend the PRACH configuration in the BWP-UplinkCommon allowed in IE UplinkConfigCommon and not in IE UplinkConfigCommonSIB*

*Proposal 4 RAN2 to introduce the parameters tag-Id2-r18 n-TimingAdvanceOffset2-r18 in ServingCellConfig*

*Proposal 5 RAN2 to discuss whether multi-TRPs with two Tas can be supported in handover case.*

### 7.20.2 Two TAs for multi-DCI multi-TRP

Remaining open issues on two TAs for multi-DCI multi-TRP operation

Contributions on open issues addressed explicitly by the email discussion [203] and [204], should be avioded.

Remaining MAC aspects

R2-2312043 Discussion on MAC aspects for Two TAs for multi-DCI multi-TRP CATT discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

*Consideration on multi-DCI multi-TRP with two TAs upon handover*

*Proposal 1: RAN2 to support to configure multi-DCI multi-TRP with two TAs upon handover.*

*Proposal 2: For multi-DCI multi-TRP with two TAs, do not make enhancement upon performing handover to the target cell associated with two TAGs, i.e., UE performs RACH to acquire the TA of one PTAG for the serving cell.*

*TAG indication for 2-step RACH*

*Proposal 3a: Confirm that the TAG indication is included in the fallbackRAR for 2-step CBRA.*

*Proposal 3b: Confirm that the TAG indication is not needed in the fallbackRAR for 2-step CFRA.*

*Proposal 4a: TAG indication is not included in successRAR.*

*Proposal 4b: Upon RRC resume by 2-step RACH, UE applies the TA received in successRAR to PTAG with TAG ID 0. It’s up to NW implementation to ensure the correct TAG indication configured in the TCI state.*

*Proposal 4c: Two-TA configuration for multi-TRP operation does not need to be released when initiating RRC resume, which follows legacy behavior.*

*RACH completion for 2-step RACH triggered by SR*

*Proposal 5: For the RACH triggered by SR, if the TAT(s) associated with at least one PTAG is running, the UE considers the RACH completion upon reception of C-RNTI addressed PDCCH that schedules a new UL transmission.*

*Co-existence of deactivated SCG with mTRP*

*Proposal 6: Do not support the co-existence of deactivated SCG with mTRP.*

R2-2312409 Discussion on remaining issues on MIMO OPPO discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

*Proposal 1: Two TA operation is supported only in Connected state*

*Proposal 2: no TAG indication in successRAR is needed*

*Proposal 3: TAG indication is supported for FallbackRAR*

*Proposal 4: For RACH procedure triggered by SR, legacy text is applied i.e. no change is needed*

*Proposal 5: For the case where MTTD exceeds between STAGs, the TAT of one of the STAGs will stop*

*Proposal 5a: RAN2 need discuss whether it can be completely left for UE’s implementation*

*Proposal 6: For the case where MTTD exceeds between PTAGs, TAT of both PTAGs keep running*

*Proposal 7: two TA operation is also supported for CFRA or CBRA triggered by mobility event without parallel RACH procedures for two TAGs.*

*Proposal 8: RAN2 discuss whether one shot siganling principle is still applied for MAC CEs activating Rel18 TCI states*

R2-2313428 Contention resolution while SpCell is configured with 2 TAGs Nokia, Nokia Shanghai Bell discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

*Proposal 1: When MsgA is transmitted (for no BFR case), when the UL grant indicates a new transmission towards a PTAG for which TAT is running, the UE can consider the RA procedure successfully completed; otherwise, the UE attempts to receive the Absolute TAC MAC CE.*

*Proposal 2: For 4-step RA, if the Random Access procedure was initiated by the MAC sublayer itself (other than for BFR case) or by the RRC sublayer, the contention resolution is considered successful only if the UL grant for new transmission is addressed to a TAG for which TAT is running.*

R2-2313439 Discussion on remaining issues on 2TA enhancement NTT DOCOMO, INC. discussion Rel-18

*Proposal 2. PSCells with 2 TAs are not assumed to be deactivated in this release.*

R2-2312392 Discussion on MTTD in 2TAs mTRP LG Electronics Inc. discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

*Proposal 1. RAN2 waits RAN4 to define the UE behaviour related to uplink transmission for MTTD between TAGs configured per TRP.*

*Proposal 2. RAN2 defines the detailed UE behaviour related to TAT expiry for MTTD between TAGs configured per TRPs based on RAN4 decision.*

*Proposal 3. RAN2 considers the following as a baseline if RAN4 decides that the UE behaviour is to stop UL transmission or left up to UE implementation.*

*- The MAC entity considers TAT associated the concerned TRP as expired.*

*Proposal 4. RAN2 does not need to define anything about the UE behaviour related to TAT expiry if RAN4 decides that the UE behaviour is to monitor RTD consistently.*

*Proposal 5. Whether the concerned TAG is both TAGs or one TAG is determined based on RAN4 decision.*

Remaining RRC aspects

R2-2313537 Remaining CP issues Ericsson discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core Late

R2-2312103 RRC remaining issues on two TAs for multi-DCI multi-TRP Samsung discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

R2-2312783 Further Consideration on the RRC parameter for MIMO evo ZTE Corporation,Sanechips discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

R2-2312044 Discussion on RRC aspects for Two TAs for multi-DCI multi-TRP CATT discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

R2-2312372 Further corrections on the MIMO RRC parameters Samsung discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

* ?? Offline discussions, taking into account the above RRC related proposals, to form a set of agreeable proposals for RRC open issues (prioritize critical open issues for WI completion from R2 point of view). Report to be treated in CB session.

R2-2312011 Discussion of supporting 2 TAGs in a serving cell Fujitsu discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

R2-2312102 MAC remaining issues on two TAs for multi-DCI multi-TRP Samsung discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

R2-2312221 Discussion on two TAs for multiple TRPs SHARP Corporation discussion NR\_MIMO\_evo\_DL\_UL-Core

R2-2312391 Remaining issues on RA procedure in 2TAs mTRP LG Electronics Inc. discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

R2-2312479 Remaining issues on Two TAs for multi-TRP operation Lenovo discussion Rel-18

R2-2312784 Further consideration on RACH for MTRP With 2TA ZTE Corporation,Sanechips discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

R2-2312785 Further Consideration on TA Handling for MTRP With 2TA ZTE Corporation,Sanechips discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

R2-2312919 Remaining issues on multi-DCI multi-TRP with two TAs Qualcomm Incorporated discussion NR\_MIMO\_evo\_DL\_UL-Core

R2-2313390 Clarification on the PUCCH or SRS release Xiaomi discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

R2-2313429 Miscellaneous issues with 2 TAGs framework Nokia, Nokia Shanghai Bell discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

R2-2313524 Remaining issues on 2TA for mTRP Huawei, HiSilicon discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

R2-2313540 Discussion on OIs for multi-DCI\_TRP 2TAs Ericsson discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core Late

### 7.20.3 Other

Other issues if not covered by the previous agenda items, including e.g., unified TCI extension to mTRP operation, etc..

Contributions on open issues addressed explicitly by the email discussion [203] and [204], should be avioded.

R2-2312611 Design of sDCI MAC CE for Rel-18 MIMO Nokia Corporation discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

R2-2313525 Extension of unified TCI framework for mTRP Huawei, HiSilicon discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

R2-2313526 Overlapping UL grants handling for STxMP and codebook configuration for CJT Huawei, HiSilicon discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

## List of post meeting email discussions

TBD