3GPP TSG-RAN WG2 Meeting #128 draft R2-2501332

Athens, Greece, Feb. 17th – 21st, 2025

Source: RAN2 Vice Chairman (CATT)

Title: Report from session on Rel-18 MIMO, Rel-19 MIMO, LPWUS, SBFD, NR Others

## Organizational email discussion

* [AT129][200] Organizational – Rel-18 MIMO, Rel-19 MIMO, LPWUS, and SBFD (RAN2 VC)

Scope:

a) Share plans for online/offline discussions during the meeting, and

b) Share draft session notes and agreements for review

#### 7.0.2.13 NR MIMO evolution

(NR\_MIMO\_evo\_DL\_UL-Core; leading WG: RAN1; REL-18; WID: [RP-233028](http://ftp.3gpp.org/tsg_ran/TSG_RAN/TSGR_98e/Docs/RP-223276.zip))

On precoder indication for 8-Port CG-PUSCH

R2-2500009 LS on Precoder Indication for 8-Port CG-PUSCH (R1-2410836; contact: Google) RAN1 LS in Rel-18 NR\_MIMO\_evo\_DL\_UL-Core To:RAN2

* Noted

R2-2500107 Introduction of RRC parameters for 8-port CG-PUSCH Google CR Rel-18 38.331 18.4.0 5199 - F NR\_MIMO\_evo\_DL\_UL-Core

R2-2500726 Correction on Precoder Indication for 8-Port CG-PUSCH Ericsson CR Rel-18 38.331 18.4.0 5221 - F NR\_MIMO\_evo\_DL\_UL-Core

Discussion

- OPPO think Google CR is good baseline but point out some minor issue in CR coversheet. ZTE likes Ericsson CR better since it is simple.

* [AT129][201][MIMOevo] Updated CR on RRC parameters for 8-port CG-PUSCH (Google)

Scope: Updated the CR, taking into account R2-2500726 and comments from companies

 Intended outcome: Updated CR in R2-2501441.

 Deadline: before CB

On applied TCI states for PDCCH reception

R2-2500013 LS on condition of applying both indicated TCI states for PDCCH reception (R1-2410916; contact: Samsung) RAN1 LS in Rel-18 NR\_MIMO\_evo\_DL\_UL-Core To:RAN2

* Noted

R2-2500157 Correction to applied TCI state for mTRP PDCCH reception Samsung CR Rel-18 38.331 18.4.0 5200 - F NR\_MIMO\_evo\_DL\_UL-Core

Discussion

- For change #1, HW suggest to use the usual wording for configuration restriction. Samsung OK to change but think the current wording is from R1 and similar wording is used today. Nokia think we can go with R1 wording.

- For change #2, HW and Nokia think it is fine, while CATT think this is already clear in R1 spec, so no need to change.

[CB - Samsung] will check in CB, with refined wording if needed.

On TDD UL/DL configuration for two TA

R2-2500709 Remaining details on TDD UL/DL Configuration for Two TA Ericsson discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

* Noted

*Proposal 1 Agree to add configuration for TDD-UL-DL-ConfigCommon for each additionalPCI.*

*Proposal 2 Agree to add the configuration for TDD-UL-DL-ConfigCommon in IE ServingCellConfig by extending the IE MIMOParam.*

*Proposal 3 Agree to use a new AddModList additionalTDDConfig-perPCI-ToAddModList-r18 for the configuration for TDD-UL-DL-ConfigCommon.*

*Proposal 4 Agree CR in R2-2500710 as baseline for the discussion.*

R2-2500710 Correction on TDD UL/DL Configuration for Two TA Ericsson CR Rel-18 38.331 18.4.0 5219 - F NR\_MIMO\_evo\_DL\_UL-Core

* [AT129][202][MIMOevo] Proposal on TDD UL/DL Configuration for Two TA (Ericsson)

Scope: Updated CR or set of questions to ask R1, if needed

 Intended outcome: Updated CR (if agreeable) or summary with proposals in R2-2501442

 Deadline: before CB

On UE capability pusch-DMRS8Tx-r18

R2-2501117 Correction on pusch-DMRS8Tx-r18 Huawei, HiSilicon CR Rel-18 38.331 18.4.0 5260 - F NR\_MIMO\_evo\_DL\_UL-Core

* The CR is agreed

On supporting 8Tx in MAC

R2-2500410 Correction on supporting 8Tx in MAC specification - method 2 ASUSTeK CR Rel-18 38.321 18.4.0 1990 1 F NR\_MIMO\_evo\_DL\_UL-Core R2-2410174

[CB] will check in CB, to see if there is R1 progress

R2-2501238 Clarification On SP CSI Reporting Activation/Deactivation For 8Tx R2 CR Rel-18 38.321 18.4.0 2040 - F NR\_MIMO\_evo\_DL\_UL-Core Withdrawn

R2-2501297 Clarification On SP CSI Reporting Activation/Deactivation For 8Tx R2 CR Rel-18 38.321 18.4.0 2043 - F NR\_MIMO\_evo\_DL\_UL-Core Withdrawn

R2-2501301 Clarification On SP CSI Reporting Activation/Deactivation For 8Tx R2 CR Rel-18 38.321 18.4.0 2046 - F NR\_MIMO\_evo\_DL\_UL-Core

=> Withdrawn

## 8.4 Low-power wake-up signal and receiver for NR (LP-WUS/WUR)

(NR\_LPWUS-Core; leading WG: RAN1; REL-19; WID [RP-241824](http://ftp.3gpp.org/tsg_ran/TSG_RAN/TSGR_105/Docs/RP-241824.zip))

Time budget: 1 TU

Tdoc Limitation: 3 tdocs

### 8.4.1 Organizational

LS, Rapporteur input, including workplan, etc.

LSin

R2-2500012 LS on LP-WUS operation in CONNECTED mode (R1-2410909; contact: NTT DOCOMO) RAN1 LS in Rel-19 NR\_LPWUS To:RAN2

=> The document is moved to 8.4.4

R2-2500050 LS Reply on LP-WUS subgrouping (S2-2412876; contact: Huawei) SA2 LS in Rel-19 NR\_LPWUS-Core To:RAN2, RAN3, CT1

R2-2500150 LR and MR operating frequencies Vodafone, Huawei, HiSilicon,Vivo discussion Rel-19

R2-2500302 Discussion on SA2 LS on LP-WUS subgrouping Huawei, HiSilicon discussion Rel-19 NR\_LPWUS-Core

=> The above 3 documents are moved to 8.4.2

Running CR

*Chair: No detailed discussions expected in this meeting. All running CRs for this WID should be created/updated after this meeting, and submitted to the next meeting for discussions/endorsement.*

R2-2501092 Introduction of LP-WUS/LP-WUR Ericsson draftCR Rel-19 38.331 18.4.0 F NR\_LPWUS-Core

* Noted

### 8.4.2 Procedure and configuration of LP-WUS in RRC\_IDLE/INACTIVE

Procedure and configuration of LP-WUS indicating paging monitoring triggered by LP-WUS, including at least configuration, sub-grouping, entry/exit condition for LP-WUS monitoring, and separate band issues following WF in RP‑243266

Separate band issues

R2-2500150 LR and MR operating frequencies Vodafone, Huawei, HiSilicon,Vivo discussion Rel-19

*Proposal 1: Standardize solution 2 from RAN Plenary WF in release 19.*

* Noted

R2-2501006 Discussion on RRC CONNECTION load balancing for LP-WUS capable UEs NTT DOCOMO INC.. discussion Rel-19

*Proposal 1: Indicate some information on SIB(SIB1) for the LP-WUS capable UEs to prioritize the current LP-WUS band is the highest priority in which the UE monitors LP-WUS.*

*Proposal 2: Dedicated signal can be applied to support LP-WUS capable UE to camp on LP-WUS Band*

* Noted

R2-2501017 Further considerations on LP-WUS operation in IDLE INACTIVE mode CMCC discussion Rel-19 NR\_LPWUS-Core

*Proposal 4: Solution 3 is used for LR and MR operating on different bands case in Rel-19.*

* Noted

R2-2501089 Procedure and configuration of LP-WUS for IDLE and INACTIVE mode ZTE Corporation, Sanechips discussion Rel-19 NR\_LPWUS-Core

*Proposal 9: For the case that UE support LP-WUS reception in a subset of bands among all the bands supported by UE, both solution 1 and solution 3 are supported. It is up to network to prioritize frequencies supporting both MR and LR, i.e. solution 1, and/or redirect UE to a frequency supporting MR only if frequencies supporting both MR and LR are overloaded, i.e. solution 3.*

* Noted

R2-2501252 LP-WUS operation in IDLE/Inactive state Qualcomm Incorporated discussion NR\_LPWUS-Core

*Proposal 1 Reuse existing dedicated frequency priority to distribute UEs to other frequency bands to reducing LP-WUS cell overload.*

* Noted

Discussion

* VDF think the problem is the load in low band and think only solution 2 can solve it. VDF think it is critical to solve this issue otherwise it is useless. HW agree. HW think if we only allows some of the UEs to enjoy the feature then the benefit is less. Apple see some benefit of O2.
* IDT thinks solution 2 will impact paging procedure and think it is not within scope of the work.
* LG E think the number of UEs implementing LPWUS may not be huge, so the load issue is not so serious. QC share this view, and think UE has different capabilities and this may be issue form some UEs. ZTE, CATT agree.
* OPPO think it is beneficial for UEs to camp on LR bands, but on the other hand the load issue may not be so critical. So OPPO prefer solution 1.
* Samsung have sympathy to VDF proposal but would like to understand why the issue is so critical, and think solution 1 is better option.
* CATT think solution 2 may change RACH procedure and may involve R4 work, not sure if we can finish this in R19. MTK, Apple agree.
* MTK not sure about motivation of solution 2.
* Xiaomi do not support solution 2 and think it is new feature with big impact.
* Xiaomi think solution 1 cannot work alone, so we also need solution 3.
* Lenovo think the solution should be future proof, even if we will not have large UE number in the near future but it can grow. Lenovo prefer long term solution.
* Ericsson think we should confirm from UE vendor first whether there is real issue that UE only support LPWUS in low band. Ericsson do not think we need to discuss solution 2 before the issue itself is confirmed.
* NEC support solution 2, but ok with solution 1 + 3. Vivo has similar view.
* Vivo think we should respect operator concern and think different solutions are for different scenarios.
* Nokia ask whether solution 1 is needed for solution 2.
* [AT129][203][LPWUS] Proposals for LPWUS separate band issue (vivo)

Scope: Discuss the issue, pros and cons of existing solutions, and try to form a WF

 Intended outcome: Summary/Proposals in R2-2501443.

 Deadline: before Thursday CB

Sub-grouping

R2-2500456 Discussion on LP-WUS procedure and configuration OPPO discussion Rel-19 NR\_LPWUS-Core

*Proposal 3 The formula for UE\_ID based PEI subgrouping is reused for UE\_ID based subgrouping for LP-WUS.*

R2-2501252 LP-WUS operation in IDLE/Inactive state Qualcomm Incorporated discussion NR\_LPWUS-Core

*Proposal 9 The formula for UE\_ID based PEI subgrouping is taken as baseline for LP-WUS UE\_ID based PEI subgrouping.*

*Proposal 10 If enhancement is needed, then option 1 can be acceptable.*

R2-2500143 General considerations on the procedure for RRC\_IDLE\_INACTIVE Xiaomi Communications discussion

*Proposal 3 For UE\_ID based subgrouping, similar formula defined for PEI subgrouping is reused for LP-WUS subgrouping, i.e.,*

*SubgroupID = (floor (UE\_ID/(N\*Ns\*Np)) mod subgroupsNumForUEID) + (subgroupsNumPerPO – subgroupsNumForUEID), where*

*- UE\_ID is related to 5G-S-TMSI,*

*- N is the number of total paging frames in one DRX cycle,*

*- Ns is the number of the PO for a PF,*

*- Np is the number of subgroupNumForUEID for PEI, if configured and UE supports PEI; otherwise, Np is 1,*

*- subgroupsNumForUEID and subgroupsNumPerPO are the subgroup number for UE\_ID based subgrouping for LP-WUS and the total subgroup number for LP-WUS, respectively.*

R2-2500589 Procedure and configuration of LP-WUS in RRC\_IDLE/INACTIVE Apple discussion Rel-19 NR\_LPWUS-Core

*Proposal 5: Agree the UE\_ID based LP-WUS subgrouping formula as below:*

*SubgroupID = (floor (UE\_ID/(N\*Ns\*K)) mod subgroupsNumForUEID\_LP-WUS) + (subgroupsNumPerPO\_LP-WUS – subgroupsNumForUEID\_LP-WUS)*

*• UE\_ID is related to 5G-S-TMSI.*

*• N is the number of total paging frames in one DRX cycle.*

*• Ns is the number of the PO for a PF.*

*• K is the configured value in SIB1; if not configured, K is 1.*

*• subgroupsNumForUEID\_LP-WUS is the subgroup number for UE\_ID based LP-WUS subgrouping.*

*• subgroupsNumPerPO\_LP-WUS is the total number of LP-WUS subgroups in a PO.*

Discussions on the options

* Samsung, LG E support O3. LG E think by Option 2 the number of subgroup is different for PEI and LPWUS. IDT agree.
* ZTE support xiaomi proposal.
* CATT think Apple proposal allows full configuration flexibility. HW support Apple proposal.
* Lenovo agree with QC proposal. Lenovo think NW implementation can choose proper number of subgroups and it is easy to achieve.
* Ericsson do not agree with O3.
* NEC slightly prefer O1.

Discussion on whether we send LS

* CATT suggest to send this agreement to R3. Xiaomi, NEC agree that we can send LS. Ericsson think we can discuss option to avoid potential impact to other WG.

[CB] check offline whether a LS is needed.

* For UE\_ID based subgrouping, similar formula defined for PEI subgrouping is reused for LP-WUS subgrouping, i.e.,

**SubgroupID = (floor (UE\_ID/(N\*Ns\*Np)) mod subgroupsNumForUEID) + (subgroupsNumPerPO – subgroupsNumForUEID), where**

**- UE\_ID is related to 5G-S-TMSI,**

**- N is the number of total paging frames in one DRX cycle,**

**- Ns is the number of the PO for a PF,**

**- Np is the number of subgroupNumForUEID for PEI, if configured and UE supports PEI; otherwise, Np is 1,**

**- subgroupsNumForUEID and subgroupsNumPerPO are the subgroup number for UE\_ID based subgrouping for LP-WUS and the total subgroup number for LP-WUS, respectively.**

Issues related to SA2 LS (R2-2500050/S2-2412876)

R2-2500050 LS Reply on LP-WUS subgrouping (S2-2412876; contact: Huawei) SA2 LS in Rel-19 NR\_LPWUS-Core To:RAN2, RAN3, CT1

* Noted

*On LP-WUS related terminology*

R2-2500302 Discussion on SA2 LS on LP-WUS subgrouping Huawei, HiSilicon discussion Rel-19 NR\_LPWUS-Core

*“LP-WUS” terminology*

*Proposal 1: RAN2 to confirm that the “LP-WUS” terminology can be used, since LP-WUS is received with low power consumption by LP-WUR.*

*Proposal 2: RAN2 sends reply LS to SA2/RAN3/CT1, and CC RAN1 and RAN4 on “LP-WUS” terminology.*

* Noted
* RAN2 sends reply LS to SA2/RAN3/CT1, and CC RAN1 and RAN4 to confirm the “LP-WUS” terminology. LS is cc to RAN1 and RAN4.

*On UE Radio Capability for Paging Information*

R2-2500343 Discussion on LP-WUS WUR in RRC\_IDLE INACTIVE vivo discussion Rel-19 NR\_LPWUS-Core

*Proposal 21: Reply LS to SA2 that it is up to network implementation to address the misalignment issue between the gNB and the UE on the UE capability of supporting LP-WUS in case the Initial Registration is performed on a pre-Rel-19 gNB, e.g., all legacy gNB is upgraded to support the latest ASN.1 for the UE capability on LP-WUS. No specification impact is foreseen.*

R2-2500302 Discussion on SA2 LS on LP-WUS subgrouping Huawei, HiSilicon discussion Rel-19 NR\_LPWUS-Core

*Proposal 3: RAN2 to confirm that the UE will miss the paging message due to the mismatch of using LP-WUS between UE and gNB, if UE does not know the gNB is not able to forward the LP-WUS capability to CN.*

*Proposal 4: It is suggested to consider to specify a solution to solve the mismatch of LP-WUS capability between the UE and the network.*

*Proposal 5: It is suggested to focus on LP-WUS aspect first and a consistent solution for all identified features with the same issue can be considered in general agenda item.*

R2-2501093 LP-WUS in Idle and Inactive Ericsson discussion Rel-19 NR\_LPWUS-Core R2-2410085

*Proposal 5 The LP-WUS UE-ID based subgrouping UE capability is included in the UE-RadioPagingInfo container.*

R2-2501089 Procedure and configuration of LP-WUS for IDLE and INACTIVE mode ZTE Corporation, Sanechips discussion Rel-19 NR\_LPWUS-Core

Proposal 8:RAN2 reply the SA2 LS to indicate that:

…

*RAN2 will include the LP-WUS capability(e.g. AS capability) in ue-RadioPagingInfo-r17 IE of UECapabilityInformation message, the ue-RadioPagingInfo-r17 IE is already included in UERadioPagingInformation container(which is included in RAN3 IE of UE Radio Capability for Paging IE) and is transparently passed from gNB to AMF, from AMF to gNB and from one gNB to another gNB. Thus, the LP-WUS capability will not be lost if the gNB is rel-17 or later.*

*RAN2 confirms that the LP-WUS capability is independent from the other features (e.g. can work with or without other features that are signalled within the UE Radio Capability for Paging Information).*

Discussion

* QC think this can be solved by NW implementation, and think it is mainly based on supporting the IE structure in ASN. Samsung, NEC agree.
* OPPO share HW’s view that we need to solve the paging missing issue and we need a specified solution.
* Xiaomi think we had similar discussion in R17 PEI and think similar here in R2 we do not need to do anything.
* CATT think we first discuss whether there is an issue, and think for pre R17 gNB there may be issue. HW agree.
* Lenovo not sure what is the problem and think the capability is anyway stored by NW.
* HW agree with Ericsson proposal.
* HW think we need to also consider x-vendor cases so it is not always ok to rely on implementation.
* Ericsson think NW should handle this case when new feature is introduced, and think if we rely on standardized solution there is impact for both UE and NW.
* VDF pointed out that they are initiating this discussion in SA2, and think if we do not solve it there is paging failure.
* Ericsson think the issue also has R3 impact.
* WI rapp suggest we can conclude first that there is no issue for after R17 NW, and for pre R17 it is better to check in main session.
* Regarding the SA2 raised issue on UE Radio Capability for Paging Information, R2 understand that there is no issue for NW after Release 17 (in which case the LP-WUS UE-ID based subgrouping UE capability is included in the UE-RadioPagingInfo container). Whether there is issue for the other cases (for the features mentioned by SA2 LS R2-2500050) can be further discussed in the main session.

Chair: we will use post meeting email disc to do a reply LS to SA2.

R2-2500135 Discussion of LR and MR operating in same/different frequency band MediaTek Inc. discussion Rel-19 NR\_LPWUS-Core

R2-2500143 General considerations on the procedure for RRC\_IDLE\_INACTIVE Xiaomi Communications discussion

R2-2500158 Discussion on procedure and configuration of LP-WUS in RRC\_IDLE/INACTIVE Huawei, HiSilicon discussion Rel-19 NR\_LPWUS-Core

R2-2500246 LP-WUS in RRC\_IDLE/INACTIVE CATT discussion Rel-19 NR\_LPWUS-Core

R2-2500282 Discussion on LP-WUS in RRC\_IDLE/INACTIVE NEC discussion NR\_LPWUS-Core

R2-2500343 Discussion on LP-WUS WUR in RRC\_IDLE INACTIVE vivo discussion Rel-19 NR\_LPWUS-Core

R2-2500456 Discussion on LP-WUS procedure and configuration OPPO discussion Rel-19 NR\_LPWUS-Core

R2-2500589 Procedure and configuration of LP-WUS in RRC\_IDLE/INACTIVE Apple discussion Rel-19 NR\_LPWUS-Core

R2-2500645 Discussion on LP-WUS in RRC\_IDLE/INACTIVE HONOR discussion Rel-19 NR\_LPWUS-Core

R2-2500663 On Idle/Inactive mode procedures for LP-WUS Tejas Network Limited discussion Rel-19

R2-2500740 RAN2 aspects on LP-WUS/WUR in RRC Idle/Inactive mode Sony discussion Rel-19 NR\_LPWUS-Core

R2-2500857 Procedure and Configuration of LP-WUS in RRC IDLE/INACTIVE Lenovo discussion NR\_LPWUS-Core

R2-2500868 LP-WUS operation in RRC\_IDLE and RRC\_INACTIVE LG Electronics Inc. discussion Rel-19 NR\_LPWUS-Core

R2-2500943 Discussion on LP-WUS operation in RRC\_IDLE/INACTIVE modes InterDigital, Inc. discussion Rel-19 NR\_LPWUS-Core

R2-2500993 LP-WUS in IDLE and INACTIVE Nokia discussion Rel-19 NR\_LPWUS-Core

R2-2501002 Discussion on the LP-WUS handling for Emergency call back NTT DOCOMO INC.. discussion Rel-19

R2-2501006 Discussion on RRC CONNECTION load balancing for LP-WUS capable UEs NTT DOCOMO INC.. discussion Rel-19

R2-2501017 Further considerations on LP-WUS operation in IDLE INACTIVE mode CMCC discussion Rel-19 NR\_LPWUS-Core

R2-2501075 Discussion on LP-WUS in RRC\_IDLE and RRC\_INACTIVE Sharp discussion Rel-19

R2-2501089 Procedure and configuration of LP-WUS for IDLE and INACTIVE mode ZTE Corporation, Sanechips discussion Rel-19 NR\_LPWUS-Core

R2-2501093 LP-WUS in Idle and Inactive Ericsson discussion Rel-19 NR\_LPWUS-Core R2-2410085

R2-2501132 Procedure and Configuration of LP-WUS in RRC Idle Inactive Mode Samsung discussion Rel-19

R2-2501252 LP-WUS operation in IDLE/Inactive state Qualcomm Incorporated discussion NR\_LPWUS-Core

### 8.4.3 RRM measurement relaxation and offloading in RRC\_IDLE/INACTIVE

RRM relaxation of UE MR for both serving and neighbor cell measurements, and UE serving cell RRM measurement offloaded from MR to LP-WUR, including the necessary conditions

Serving cell RRM relaxation criteria, to include LR measurement or not

R2-2500869 RRM relaxation and RRM offloading LG Electronics Inc. discussion Rel-19 NR\_LPWUS-Core

*Proposal 6 [For case #3] If the condition for measurement relaxation is met, UE performs serving cell measurements using only MR with relaxed requirement. No LR measurements.*

R2-2500944 Discussion on RRM measurement relaxation and offloading InterDigital, Inc. discussion Rel-19 NR\_LPWUS-Core

*Proposal 4: For partially offloading case, support the exit condition based on LR measurement.*

R2-2501254 LP-WUS RRM measurement relaxation and offloading Qualcomm Incorporated discussion NR\_LPWUS-Core

*Proposal 4 The entry condition for partially offloading:*

*- When both MR and LR measurement are above the thresholds defined for partially offloading, and,*

*- When any of LR and MR measurement is below the threshold which is defined for totally offloading*

Serving cell RRM relaxation criteria, whether separate exit condition is needed

R2-2501043 Discussion on RRM measurement relaxation and offloading in RRC\_IDLE INACTIVE CMCC discussion Rel-19 NR\_LPWUS-Core

*Proposal 6: No separate exit condition is needed, and the exit condition can be defined as failing to meet the entry condition.*

R2-2501133 RRM measurement relaxation and offloading in RRC Idle Inactive Mode Samsung discussion Rel-19

*Proposal 3: Similar to serving cell offloading, the exit conditions of MR serving cell RRM measurement relaxation are:*

* If the serving cell quality from LR is below a threshold*

* FFS low mobility criterion*

R2-2500247 RRM Relaxation and Offloading in RRC\_IDLE/INACTIVE CATT discussion Rel-19 NR\_LPWUS-Core

*Proposal 4: RAN2 discuss which option is adopted for MR RRM relaxation*

*- Option 1: Serving cell quality measured by MR is higher than relaxation threshold, while serving cell quality measured by LR is higher than relaxation threshold. No separate exit condition.*

*- Option 2: Entry condition: based on MR serving cell quality and optional LR serving cell quality.*

*Exit condition: based on LR serving cell quality.*

RRM relaxation criteria, whether it is the same for serving cell and neighbour cell

R2-2500247 RRM Relaxation and Offloading in RRC\_IDLE/INACTIVE CATT discussion Rel-19 NR\_LPWUS-Core

*Proposal 2: Same relaxation criteria are applied to both MR serving cell and neighbor cell measurement for UEs capable of LP-WUS.*

R2-2501076 Discussion on RRM measurement relaxation and offloading Sharp discussion Rel-19

*Proposal 4: The entry conditions for serving cell RRM measurement relaxation and for neighbour cell RRM measurement relaxation can be different.*

R2-2500608 RRM measurement relaxation and offloading in RRC\_IDLE/INACTIVE Lenovo discussion Rel-19

*Proposal 5: The entry condition for serving cell RRM measurement relaxation is configured independently with the neighboring cell RRM measurement relaxation.*

R2-2500144 Discussion on RRM measurement relaxation for RRC\_IDLE\_INACTIVE Xiaomi Communications discussion

R2-2500201 Further discussion on the criteria for RRM measurement relaxation and offloading Huawei, HiSilicon discussion Rel-19 NR\_LPWUS-Core

R2-2500247 RRM Relaxation and Offloading in RRC\_IDLE/INACTIVE CATT discussion Rel-19 NR\_LPWUS-Core

R2-2500283 Discussion on LP-WUS RRM relaxation and offloading NEC discussion NR\_LPWUS-Core

R2-2500344 Discussion on RRM measurement relaxation and offloading in RRC\_IDLE/INACTIVE vivo discussion Rel-19 NR\_LPWUS-Core

R2-2500457 Discussion on RRM measurement in RRC IDLE and INACTIVE OPPO discussion Rel-19 NR\_LPWUS-Core

R2-2500590 RRM measurement relaxation and offloading in RRC\_IDLE/INACTIVE Apple discussion Rel-19 NR\_LPWUS-Core

R2-2500608 RRM measurement relaxation and offloading in RRC\_IDLE/INACTIVE Lenovo discussion Rel-19

R2-2500869 RRM relaxation and RRM offloading LG Electronics Inc. discussion Rel-19 NR\_LPWUS-Core

R2-2500944 Discussion on RRM measurement relaxation and offloading InterDigital, Inc. discussion Rel-19 NR\_LPWUS-Core

R2-2500994 RRM measurement relaxation in RRC\_IDLE/INACTIVE Nokia discussion Rel-19 NR\_LPWUS-Core

R2-2501043 Discussion on RRM measurement relaxation and offloading in RRC\_IDLE INACTIVE CMCC discussion Rel-19 NR\_LPWUS-Core

R2-2501068 Discussion on RRM measurement relaxation and offloading for RRC\_IDLE/INACTIVE China Telecom discussion

R2-2501076 Discussion on RRM measurement relaxation and offloading Sharp discussion Rel-19

R2-2501090 RRM measurement relaxation and offloading in RRC\_IDLE and RRC\_INACTIVE mode ZTE Corporation, Sanechips discussion Rel-19 NR\_LPWUS-Core

R2-2501094 LP-WUS and RRM measurements Ericsson discussion Rel-19 NR\_LPWUS-Core R2-2410086

R2-2501131 Discussion on neighboring cell measurement with LR InterDigital, Ericsson, Nokia, Sony, Vodafone discussion Rel-19 NR\_LPWUS-Core

R2-2501133 RRM measurement relaxation and offloading in RRC Idle Inactive Mode Samsung discussion Rel-19

R2-2501254 LP-WUS RRM measurement relaxation and offloading Qualcomm Incorporated discussion NR\_LPWUS-Core

### 8.4.4 Procedures for LP-WUS in RRC\_CONNECTED

Procedures to allow UE MR PDCCH monitoring triggered by LP-WUS including activation and deactivation procedure of LP-WUS monitoring.

R2-2500012 LS on LP-WUS operation in CONNECTED mode (R1-2410909; contact: NTT DOCOMO) RAN1 LS in Rel-19 NR\_LPWUS To:RAN2

* Noted

R2-2501003 Discussion on the LS from RAN1 on LP-WUS CONNECTED NTT DOCOMO INC.. discussion Rel-19

* Noted

*Proposal1: RAN2 confirms that existing DRX Command MAC CE and Long DRX Command MAC CE can stop drx-onDurationTimer and drx-InactivityTimer for the DRX group in Option 1-1.*

*Proposal2: RAN2 confirms that it is feasible for existing DRX Command MAC CE and Long DRX Command MAC CE to stop the new timer for PDCCH monitoring in Option 1-2 and drx-InactivityTimer*

R2-2501095 LP-WUS in Connected Ericsson discussion Rel-19 NR\_LPWUS-Core R2-2410087

* Noted

*Proposal 1 (Long) DRX command MAC CE can be used with option 1-1 and 1-2 to stop drx-onDurationTimer (option 1-1), lpwus-OnDurationTimer (option 1-2) and drx-InactivityTimer. When outside Active Time the UE starts monitoring LP-WUS.*

R2-2501201 LP-WUS in RRC\_CONNECTED Nokia, Nokia Shanghai Bell discussion NR\_LPWUS-Core

* Noted

*Proposal 1: RAN2 sends a reply LS to RAN1, indicating that the (Long) DRX Command MAC CE stops drx-onDurationTimer and drx-InactivityTimer for option 1-1, as well as the new timer for option 1-2.*

R2-2500345 Discussion on LP-WUS WUR in RRC\_Connected vivo discussion Rel-19 NR\_LPWUS-Core

* Noted

*Proposal 1: RAN2 confirms in Option 1-1, LP-WUS is only applied when UE using Long DRX cycle.*

*Proposal 2: If P1 is agreed, reply RAN1 that for Option 1-1:*

*− If UE receives DRX Command MAC CE, UE will use Short DRX cycle (if configured) according to current specification, since Option 1-1 is only applied to Long DRX cycle, Option 1-1 won’t be used in this case.*

*− If UE receives Long DRX Command MAC CE or DRX Command MAC CE in case Short DRX cycle is not configured, UE will use Long DRX cycle according to current specification. When Long DRX Command MAC CE is received, the UE will leave the C-DRX Active Time, and will monitor LP-WUS.*

*Proposal 3: Reply RAN1 that for Option 1-2, if DRX command MAC CE or Long DRX command MAC CE is received, UE will stop the new timer and drx-InactivityTimer. In this case, the UE will leave C-DRX Active Time and go back to LP-WUS monitoring.*

Discussions

Whether short DRX is supported with LPWUS

* Ericsson suggest to discuss whether short DRX is support with LPWUS from R2 point of view. ZTE think it is support.
* CATT think for O1-2 short DRX is not needed, while for O1-1 we need some further analysis because there is potential impact on PS gain and also complexity. OPPO, LG E agree. OPPO and LG E think DCP and short DRX are not configured simultaneously in legacy. Nokia agree on O1-1.
* Xiaomi do not see a need to restrict the use of short DRX, and think it is R1 decision.
* Apple do not see a benefit of support short DRX, there is no motivation. NEC agree. QC ok to not have short DRX at all. Lenovo.
* Nokia think for O1-2 it can be supported.
* Ericsson think we need further discussion.
* DCM and Lenovo think this issue is not directly related to R1 questions.
* [AT129][204][LPWUS] Proposals for reply to R1 LS R2-2500012/ R1-2410909 (CATT)

Scope: Discuss R1 questions and try to form answers to the questions, can also discuss whether short DRX is supported together with LPWUS

 Intended outcome: Summary/Proposals in R2-2501444.

 Deadline: before Thursday CB

R2-2500074 Discussing on LP-WUS monitoring in Connected mode Xiaomi discussion Rel-19 NR\_LPWUS-Core

R2-2500248 Analysis on LP-WUS for RRC\_CONNECTED CATT discussion Rel-19 NR\_LPWUS-Core

=> Revised in R2-2501326

R2-2501326 Analysis on LP-WUS for RRC\_CONNECTED CATT discussion Rel-19 NR\_LPWUS-Core

R2-2500284 Discussion on LP-WUS in RRC\_CONNECTED NEC discussion NR\_LPWUS-Core

R2-2500303 Further discussion on LP-WUS for RRC\_CONNECTED mode Huawei, HiSilicon discussion Rel-19 NR\_LPWUS-Core

R2-2500345 Discussion on LP-WUS WUR in RRC\_Connected vivo discussion Rel-19 NR\_LPWUS-Core

R2-2500458 Discussion on LP-WUS in RRC\_CONNECTED OPPO discussion Rel-19 NR\_LPWUS-Core

R2-2500591 Procedures for LP-WUS in RRC\_CONNECTED Apple discussion Rel-19 NR\_LPWUS-Core

R2-2500666 LP-WUS operation in Connected mode Tejas Network Limited discussion Rel-19

R2-2500717 LP-WUS in CONNECTED mode InterDigital discussion Rel-19 NR\_LPWUS-Core

R2-2500741 Considerations on LP-WUS/WUR in RRC Connected mode Sony discussion Rel-19 NR\_LPWUS-Core

R2-2500827 Discussion on LP-WUS in RRC\_CONNECTED LG Electronics Inc. discussion Rel-19 NR\_LPWUS-Core

R2-2500860 LP-WUS in RRC Connected Mode Lenovo discussion NR\_LPWUS-Core

R2-2501003 Discussion on the LS from RAN1 on LP-WUS CONNECTED NTT DOCOMO INC.. discussion Rel-19

R2-2501018 Discussion on LP-WUS operation in CONNECTED mode CMCC discussion Rel-19 NR\_LPWUS-Core

R2-2501077 Discussion on LP-WUS in RRC\_CONNECTED Sharp discussion Rel-19

R2-2501091 Procedures for LP-WUS in RRC\_CONNECTED ZTE Corporation, Sanechips discussion Rel-19 NR\_LPWUS-Core

R2-2501095 LP-WUS in Connected Ericsson discussion Rel-19 NR\_LPWUS-Core R2-2410087

R2-2501134 Procedures for LP-WUS in RRC Connected Mode Samsung discussion Rel-19

R2-2501201 LP-WUS in RRC\_CONNECTED Nokia, Nokia Shanghai Bell discussion NR\_LPWUS-Core

R2-2501253 LP-WUS operation in CONNECTED state Qualcomm Incorporated discussion NR\_LPWUS-Core

## 8.11 Evolution of NR duplex operation: Sub-band full duplex (SBFD)

(NR\_duplex\_evo-Core; leading WG: RAN1; REL-19; WID: [RP‑241614](https://www.3gpp.org/ftp/meetings_3gpp_sync/ran/docs/RP-241614.zip))

Time budget: 0.5 TU

Tdoc Limitation: 2 tdocs

### 8.11.1 Organizational

Incoming LS, Rapporteur input, including workplan, etc..

LSin

R2-2500036 LS on CSI-RS measurement with SBFD operation (R4-2420165; contact: MediaTek) RAN4 LS in Rel-19 NR\_duplex\_evo-Core To:RAN1 Cc:RAN2

* ?? Noted

Running CR

*Chair: No detailed discussions expected in this meeting. All running CRs for this WID should be created/updated after this meeting, and submitted to the next meeting for discussions/endorsement.*

R2-2500273 38300 Running CR for SBFD CATT draftCR Rel-19 38.300 18.4.0 NR\_duplex\_evo-Core

* ?? Noted

R2-2500886 SBFD UE capabilities running CR Ericsson discussion Rel-19 NR\_duplex\_evo-Core Late

### 8.11.2 Random access in SBFD

RAN2 impacts to support SBFD operation to support random access in SBFD symbols by UEs in RRC \_CONNECTED mode and RRC\_IDLE/INACTIVE mode.

RACH configuration

R2-2500884 SBFD RA aspects Ericsson discussion Rel-19 NR\_duplex\_evo-Core

*Proposal 2 When a SBFD aware UE supporting both SBFD RACH configuration options accesses a cell, the UE applies the SBFD RACH configuration option configured in the cell.*

*Proposal 3 When a SBFD aware UE supporting a SBFD RACH configuration option accesses a cell configured with a different SBFD RACH configuration option, the UE applies the legacy RA operation instead of SBFD RA operation.*

RACH procedure, RO selection criteria

*On Network indication of RO selection priority*

R2-2500298 Random Access for SBFD Operation NEC discussion Rel-19 NR\_duplex\_evo-Core

*Proposal-3: The network can indicate the RO types (legacy RO or additional RO) to the SBFD-aware UE for the case of CBRA.*

*Proposal-4: The network indication of RO type for the case of CBRA is optional present.*

R2-2500339 Discussion on Random Access operation in SBFD InterDigital, Inc. discussion Rel-19 NR\_duplex\_evo-Core

*Proposal 1. Support indicating the additional-ROs with higher priority over legacy-ROs to the SBFD-aware UEs.*

R2-2500588 Remaining issues for RACH in SBFD Apple discussion Rel-19 NR\_duplex\_evo-Core

*Proposal 5: RAN2 to select Option 2 (no indication on prioritization of SBFD RO over legacy RO) as baseline.*

*Detailed RO selection criteria (without RO selection priority, e.g., if such priority is not supported or not configured)*

R2-2500298 Random Access for SBFD Operation NEC discussion Rel-19 NR\_duplex\_evo-Core

*Proposal-5: UE selects the first available RO type(legacy RO or additional RO) among all of the RACH resources valid to the UE for its CBRA based access, when the indication of RO type from the network is absent.*

R2-2500606 Discussion on random access procedure in SBFD ZTE Corporation discussion Rel-19 NR\_duplex\_evo-Core

*Proposal 3: RAN2 to support option 1 for RO type selection, and the SSB RSRP should not be a criteria for selecting RO type.*

*Proposal 4: Introduce a time window to let UE determine whether to select SBFD RO or legacy RO, in order to balance the RA latency and RA opportunity:*

* If UE finds the SBFD RO exists in the time window, no matter whether legacy RO is the nearest or not, UE should choose the nearest SBFD RO in the time window;*

* If UE finds there is no SBFD RO in the time window, UE should select the nearest RO based on legacy rule.*

R2-2501244 Discussion on Random Access in SBFD LG Electronics Inc. discussion Rel-19 NR\_duplex\_evo-Core

*Proposal 4. For the initial attempt of the RA procedure, if the network indication is not configured/agreed, SBFD-aware UE prioritizes SBFD RACH occasion if the channel condition is better than the RSRP threshold as a baseline. Otherwise, SBFD-aware UE performs RA procedure using legacy RACH occasion.*

R2-2500884 SBFD RA aspect Ericsson discussion Rel-19 NR\_duplex\_evo-Core

*Proposal 10 Adopt the below option for RO prioritization in case of CBRA:*

*a. The network provides a cell specific SIB1 indication whether SBFD-aware UEs shall use SBFD ROs, legacy ROs or first available RO (of any type).*

*b. If there is no such cell specific indication on the RO type, a UE selects RO based on a SSB RSRP threshold and a SIB1-provided indicator whether to use additional ROs below or above this SIB1-provided SSB RSRP threshold.*

*c. If RO prioritization information is not provided in SIB1, RO prioritization is up to UE implementation.*

RACH procedure, RO selection before or after selecting a set of RA resources

R2-2500298 Random Access for SBFD Operation NEC discussion Rel-19 NR\_duplex\_evo-Core

*Proposal-2: The RO type selection is performed after the RA type selection.*

R2-2501244 Discussion on Random Access in SBFD LG Electronics Inc. discussion Rel-19 NR\_duplex\_evo-Core

*Proposal 6. The SBFD-aware UE selects between SBFD RO and legacy RO before selecting a set of Random Access resources.*

RACH procedure, fallback behaviour

R2-2500098 Impacts on the random access by the evolution of duplex operation Huawei, HiSilicon discussion Rel-19 NR\_duplex\_evo-Core

*Proposal 6: Support that the UE is allowed to switch from the PRACH resources in SBFD symbols to the PRACH resources in non-SBFD symbol. Support to switch from the PRACH resources in non-SBFD symbols to the PRACH resources in SBFD symbols.*

R2-2500274 Discussion on Random Access in SBFD symbols CATT discussion Rel-19 NR\_duplex\_evo-Core

*Proposal 14: For CBRA, if legacy RO is selected for initial RACH transmission, it cannot fallback to SBFD RO after a number of times of RACH attempts.*

R2-2500098 Impacts on the random access by the evolution of duplex operation Huawei, HiSilicon discussion Rel-19 NR\_duplex\_evo-Core

R2-2500105 Random Access Operation of SBFD Nokia Corporation discussion Rel-19 NR\_duplex\_evo-Core

R2-2500109 SBFD Configuration for initial random access and operations Charter Communications, Inc discussion

R2-2500191 Discussion on RACH in SBFD Xiaomi discussion Rel-19

R2-2500274 Discussion on Random Access in SBFD symbols CATT discussion Rel-19 NR\_duplex\_evo-Core

R2-2500298 Random Access for SBFD Operation NEC discussion Rel-19 NR\_duplex\_evo-Core

R2-2500337 Discussion on random access procedure in SBFD vivo discussion Rel-19 NR\_duplex\_evo-Core

R2-2500339 Discussion on Random Access operation in SBFD InterDigital, Inc. discussion Rel-19 NR\_duplex\_evo-Core

R2-2500376 Random Access Issues for SBFD Sharp discussion Rel-19 NR\_duplex\_evo-Core

R2-2500588 Remaining issues for RACH in SBFD Apple discussion Rel-19 NR\_duplex\_evo-Core

R2-2500606 Discussion on random access procedure in SBFD ZTE Corporation discussion Rel-19 NR\_duplex\_evo-Core

R2-2500751 Random access for SBFD Operation Sony discussion Rel-19 NR\_duplex\_evo-Core

R2-2500884 SBFD RA aspects Ericsson discussion Rel-19 NR\_duplex\_evo-Core

R2-2501029 Discussion on random access in SBFD CMCC discussion Rel-19 NR\_duplex\_evo-Core

R2-2501129 Views on random access for SBFD Qualcomm Incorporated discussion Rel-19 NR\_duplex\_evo-Core

R2-2501135 Random access in SBFD Samsung discussion Rel-19

R2-2501244 Discussion on Random Access in SBFD LG Electronics Inc. discussion Rel-19 NR\_duplex\_evo-Core

### 8.11.3 Other aspects

Other RAN2 impacts with SBFD if not covered by the previous agenda items.

R2-2501130 Other aspects of SBFD Qualcomm Incorporated discussion Rel-19 NR\_duplex\_evo-Core

*Proposal 1: For UE-specific dedicated RRC configuration on SBFD time/frequency configuration, RAN2 wait RAN1 further decision on whether support.*

*Proposal 3: A new SP CLI measurement resource set activation/deactivation MAC CE is introduced to activate/deactivate the SP CLI measurement resource.*

*Proposal 6: For L1 based UE-to-UE CLI reporting configuration, at least AP trigger based CLI reporting is supported.*

*Proposal 7: For L1 based UE-to-UE CLI reporting configuration, RAN2 waits for RAN1 further conclusion on whether supports periodic based CLI reporting.*

*Proposal 10: RAN2 to study the MAC impacts on the corresponding MAC features like SR and CG with enabling the SBFD operation.*

R2-2501170 Other Aspects of SBFD Samsung discussion Rel-19 NR\_duplex\_evo-Core

*Proposal 6: RAN2 confirm that exchange of the information for the activation/deactivation of SRS resources between gNBs is not supported in Rel-19.*

*Proposal 7: RAN2 does not support the separate BFD/BFR procedure for SBFD symbols.*

*Proposal 8: RAN2 consider to support the separate Layer3 measurement report for CSI-RS resources in SBFD symbol.*

R2-2500637 Other impacts by the evolution of duplex operation Huawei, HiSilicon discussion Rel-19 NR\_duplex\_evo-Core

*Proposal 1: Introduce an optional capability with signaling to indicate whether UE supports UL transmission and DL reception across SBFD symbols and non-SBFD symbols in different slots.*

*Proposal 2: Send an LS to RAN1 on whether SBFD can work with DC.*

*Chair: Other detailed proposals in the following two contributions can be discussed if time allows.*

R2-2501130 Other aspects of SBFD Qualcomm Incorporated discussion Rel-19 NR\_duplex\_evo-Core

R2-2501170 Other Aspects of SBFD Samsung discussion Rel-19 NR\_duplex\_evo-Core

R2-2500110 Cross link interference handling in SBFD networks Charter Communications, Inc discussion

R2-2500275 Discussion on other aspects of SBFD CATT discussion Rel-19 NR\_duplex\_evo-Core

R2-2500338 SBFD other aspects vivo discussion Rel-19 NR\_duplex\_evo-Core

R2-2500340 Discussion on resource configuration in SBFD InterDigital, Inc. discussion Rel-19 NR\_duplex\_evo-Core

R2-2500403 Other aspects of SBFD Xiaomi discussion Rel-19 NR\_duplex\_evo-Core

R2-2500554 Other aspects of SBFD Nokia discussion Rel-19 NR\_duplex\_evo-Core

R2-2500607 Discussion on L3 and L1 measurement in SBFD ZTE Corporation discussion Rel-19 NR\_duplex\_evo-Core

R2-2500637 Other impacts by the evolution of duplex operation Huawei, HiSilicon discussion Rel-19 NR\_duplex\_evo-Core

R2-2500885 CSI-RS measurements for RLM/BFD/CBD in SBFD Ericsson discussion Rel-19 NR\_duplex\_evo-Core

R2-2501130 Other aspects of SBFD Qualcomm Incorporated discussion Rel-19 NR\_duplex\_evo-Core

R2-2501170 Other Aspects of SBFD Samsung discussion Rel-19 NR\_duplex\_evo-Core

## 8.12 NR MIMO Phase 5

(NR\_MIMO\_Ph5-Core; leading WG: RAN1; REL-19; WID: [RP-242394](http://ftp.3gpp.org/tsg_ran/TSG_RAN/TSGR_105/Docs/RP-242394.zip))

Time budget: 0.5 TU

Tdoc Limitation: 2 tdocs

### 8.12.1 Organizational

LSs and rapporteur input, including workplan, etc.

LSin

R2-2500008 LS to RAN2 on RRC and MAC impacts for Rel-19 NR MIMO Ph5 (R1-2410758; contact: Samsung) RAN1 LS in Rel-19 NR\_MIMO\_Ph5 To:RAN2

Discussion

- Samsung explains that we can note this and discuss based on contribution

* Noted

Work plan

R2-2501026 Work Plan for Rel-19 on NR MIMO Phase 5 CMCC,Samsung,MediaTek Work Plan Rel-19 NR\_MIMO\_Ph5-Core

* Noted

Running CR

*Chair: All running CRs for this WID should be created/updated after this meeting, and submitted to the next meeting for discussions/endorsement.*

### 8.12.2 Asymmetric DL sTRP/UL mTRP

To identify RRC/MAC aspects that need to be discussed for asymmetric DL sTRP/UL mTRP

MAC CE design

R2-2500179 Discussion on asymmetric DL sTRP/UL mTRP China Telecom discussion

*Proposal 2: The new MAC CE can have a variable size consisting of following fields:*

*- Serving cell ID*

*- BWP ID*

*- TCI state ID*

*- Absolute PL offset value*

R2-2500825 Consideration on Asymmetric DL sTRP/UL mTRP LG Electronics Inc. discussion Rel-19 NR\_MIMO\_Ph5-Core

*Proposal 1. RAN2 discusses how to indicate TCI state ID considering following options*

*- Option 1. Bitmap mapping for TCI state ID + PL offset value*

*- Option 2. Configured TCI state ID + PL offset value*

*Proposal 2. RAN2 design the new MAC CE considering follows.*

*- One Serving Cell field and one BWP field are included*

*- CORESET Pool ID field and D/U field are not included*

R2-2501222 Consideration on the Asymmetric DL sTRP/UL mTRP ZTE Corporation discussion Rel-19 NR\_MIMO\_Ph5-Core

*Proposal 2: The mechanism “multiple TCI states (either joint or UL) are indicated per PL offset” is not supported.*

*Proposal 5: Up to 16 joint/UL TCI states can be indicated in the PL offset MAC CE.*

R2-2501177 Discussion on Asymmetric DL sTRP/UL mTRP Huawei, HiSilicon discussion Rel-19 NR\_MIMO\_Ph5-Core

*Proposal 1: The new MAC CE for PL offset update includes flexible number of PL offsets.*

* One PL offset value is indicated for each TCI state included in the new MAC CE.

Discussion on P2 from R2-2500179

- CMCC think TCI state ID can be indicated by a bitmap. LG E agree and think bitmap can save some overhead when the # of indicated TCI states is large.

- Sony wonders why we need BWP ID. Samsung think we need this since TCI states are configured per BWP.

* The new MAC CE contains one serving cell ID and one BWP ID

Discussion on P1 from R2-2500825

- Ericsson think it is meaningful to reduce the overhead, suggest to first confirm we need a TCI state to PL value association and leaves exact way FFS.

- LG E think it depends on how many TCI states can be indicated by this MAC CE.

- OPPO think we should consider real deployment, so do not think the # is very large.

- Nokia slightly prefer O2, and not sure why bitmap way saves overhead. ZTE also do not see benefit of bitmap.

- HW think it is very important to limit the size of this MAC CE. HW prefer to put 8 as the maximum number of TCI states in one MAC CE. Vivo think we already agree that any configured TCI state can be indicated, so do not see why we can limit to 8.

- Samsung think if NW want to indicate more TCI states, it is possible to send multiple MAC CEs. Samsung prefer Option 2.

* TCI state ID is used to indicate a TCI state in the new MAC CE (i.e., no bitmap for TCI states is needed)

R2-2501222 Consideration on the Asymmetric DL sTRP/UL mTRP ZTE Corporation discussion Rel-19 NR\_MIMO\_Ph5-Core

*Proposal 2: The mechanism “multiple TCI states (either joint or UL) are indicated per PL offset” is not supported.*

*Proposal 5: Up to 16 joint/UL TCI states can be indicated in the PL offset MAC CE.*

R2-2501177 Discussion on Asymmetric DL sTRP/UL mTRP Huawei, HiSilicon discussion Rel-19 NR\_MIMO\_Ph5-Core

*Proposal 1: The new MAC CE for PL offset update includes flexible number of PL offsets.*

Discussion on P5 in R2-2501222 and P1 in R2-2501177

- HW suggest to first agree that this MAC CE can contain flexible number of PL offset values and decide maximum number later.

- Samsung suggest to discuss now.

- Apple agree with HW on the flexible number part, but not sure if we need to conclude on maximum number.

- IDT think we do not need FFS on the maximum number of PL offset values.

* The new MAC CE can include flexible number of PL offset values.

On PL offset update

R2-2501024 Discussion on Asymmetric DL sTRP/UL mTRP CMCC discussion Rel-19 NR\_MIMO\_Ph5-Core

*Proposal 1: We propose three options to address the conflicts between MAC CE and RRC when updating PL offset:*

*- Option1: For the same joint/UL TCI state, the UE should apply the latest PL offset value, whether it is represented by RRC configuration or MAC CE update.*

*- Option2: For the same joint/UL TCI state, UE needs to determine which signaling update is the latest between RRC and MAC CE, and the criteria for this determination are to be discussed (taking latency as an example)*

*- Option3: UE updates the PL offset based only on the newly received MAC CE after the initial PL offset is configured by RRC, regardless of the TCI state.*

R2-2500217 Discussion on Asymmetric DL sTRP/UL mTRP Samsung discussion Rel-19 NR\_MIMO\_Ph5

*Proposal 7: UE updates the RRC configured PL offset with MAC CE indicated value. UE applies the latest PL offset value (e.g., upon BWP switching) received in RRC or MAC CE.*

*Proposal 8: Upon receiving a PL offset update MAC CE, the MAC entity indicates to lower layer the information in the MAC CE.*

R2-2501177 Discussion on Asymmetric DL sTRP/UL mTRP Huawei, HiSilicon discussion Rel-19 NR\_MIMO\_Ph5-Core

*Proposal 7: Ask RAN1 whether, after an RRC reconfiguration in which the path loss offset values are neither released nor modified by RRC, the UE continues using the values modified by MAC CEs, or reverts to the values configured by RRC.*

*Proposal 8: Ask RAN1 whether, after BWP switching, the UE reverts to the RRC-configured path loss offset values for the new BWP or uses the last value that were used on this BWP i.e., including modifications by MAC CEs.*

Discussions

- OPPO agree with Samsung understanding and think in the case of BWP switching UE also use the latest value as indicated by the new MAC CE. Xiaomi agree.

- Ericsson think UE follow the latest value no matter it is RRC configured or MAC CE indicated value. Nokia, LG E, ZTE, Apple, vivo agree. QC also agree and think it is up to UE capability to process the indicated value.

- HW think the ‘latest indicated value’ may have ambiguity period issue.

Working assumption

* UE applies the latest PL offset value received in RRC or MAC CE. Can revisit if new issue is found.

On PHR trigger

R2-2500217 Discussion on Asymmetric DL sTRP/UL mTRP Samsung discussion Rel-19 NR\_MIMO\_Ph5

*Proposal 9: For PHR trigger, add a note in MAC specification: If a joint/UL TCI state is configured with a PL offset, PHR trigger is based on the PL change of the PL-RS associated to the joint/UL TCI, where the PL change takes into account the PL offset.*

R2-2500104 RAN2 Aspects of Asymmetric DL sTRP/UL mTRP Nokia Corporation discussion Rel-19 NR\_MIMO\_Ph5-Core

*Proposal 1: RAN2 to confirm that PL offset has no impact on PHR triggering condition as the PL offset is applied in the PHY during the calculation of PL value.*

Discussions

- Ericsson agree the intention of both paper, and think it is nice to use a note in MAC to clarify how it works. Ericsson think there is already a note in MAC mentioning this.

- Qualcomm think the PL calculation in 213 which is R1 spec, so do not think we need to capture in MAC. LG E agree and think MAC just refer to PL value from PHY when needed. Xiaomi agree. Xiaomi think having a note is clear.

- OPPO open to confirm this understanding and do either way.

- Qualcomm suggest to send our understanding to R1.

* RAN2 understands that if a joint/UL TCI state is configured with a PL offset, PHR trigger is based on the PL change of the PL-RS associated to the joint/UL TCI, where the PL change takes into account the PL offset. FFS whether/how to capture this.

R2-2500104 RAN2 Aspects of Asymmetric DL sTRP/UL mTRP Nokia Corporation discussion Rel-19 NR\_MIMO\_Ph5-Core

R2-2500179 Discussion on asymmetric DL sTRP/UL mTRP China Telecom discussion

R2-2500217 Discussion on Asymmetric DL sTRP/UL mTRP Samsung discussion Rel-19 NR\_MIMO\_Ph5

R2-2500249 Discussion on Asymmetric DL sTRP UL mTRP CATT discussion Rel-19 NR\_MIMO\_Ph5-Core

R2-2500268 Discussion on asymmetric DL sTRP and UL mTRP Xiaomi discussion Rel-19 NR\_MIMO\_Ph5-Core

R2-2500354 Discussion on MAC CE impact for asymmetric DL sTRP/UL mTRP scenarios vivo discussion Rel-19 NR\_MIMO\_Ph5-Core

R2-2500450 Discussion on asymmetric DL sTRP and UL mTRP SHARP Corporation discussion NR\_MIMO\_Ph5-Core

R2-2500635 Discussion on PL offset Lenovo discussion Rel-19

R2-2500752 Enhancement for Asymmetric DL sTRP/UL mTRP Sony discussion Rel-19 NR\_MIMO\_Ph5

R2-2500825 Consideration on Asymmetric DL sTRP/UL mTRP LG Electronics Inc. discussion Rel-19 NR\_MIMO\_Ph5-Core

R2-2500975 Asymmetric DL/UL mTRP user plane impact from MIMO ph. 5 Ericsson discussion Rel-19 38.321 NR\_MIMO\_Ph5-Core

R2-2501024 Discussion on Asymmetric DL sTRP/UL mTRP CMCC discussion Rel-19 NR\_MIMO\_Ph5-Core

R2-2501166 Discussion on UL only mTRP Qualcomm Incorporated discussion

R2-2501177 Discussion on Asymmetric DL sTRP/UL mTRP Huawei, HiSilicon discussion Rel-19 NR\_MIMO\_Ph5-Core

R2-2501222 Consideration on the Asymmetric DL sTRP/UL mTRP ZTE Corporation discussion Rel-19 NR\_MIMO\_Ph5-Core

### 8.12.3Others

To identify R2 impact on other objectives

UE initiated beam reporting, modelling

[CB]

R2-2500930 Impacts from other NR MIMO Phase 5 objectives Ericsson discussion

*Proposal 1 The event evaluation for UE-initiated beam reporting is captured in 38.321, where the evaluation is based on indications from measurements described in a RAN1 specification.*

*Proposal 2 RAN2 to inform RAN1 on its preference of specifying the triggering event determination for Event 2.*

R2-2500210 Discussion on UEI beam reporting OPPO discussion Rel-19 NR\_MIMO\_Ph5-Core

*Proposal 1 The event evaluation for UE initiated beam reporting is specified in PHY.*

R2-2500218 Discussion on UE-initiated Beam Reporting and CSI enhancement Samsung discussion Rel-19 NR\_MIMO\_Ph5

*Proposal 1: RAN2 confirms that UEI beam reporting does not share common framework of LTM event-triggered L1 measurement.*

*Proposal 2: Send a LS to RAN1 to ask whether the procedure of handling time window and counter for event evaluation/triggering is to be captured in RAN1 or RAN2 specification. Adopt the draft LS in the appendix as baseline.*

UE initiated beam reporting, other potential issues

R2-2501176 Enhancements for UE-initiated/event-driven beam management Huawei, HiSilicon discussion Rel-19 NR\_MIMO\_Ph5-Core

*Proposal 6: Send a LS to RAN1 to ask whether the UEI beam reporting for mode-B is visible to the MAC layer.*

*Proposal 7: In mode-A of UEIBM, the UE should remain in DRX active time to receive DCI for the second UL transmission.*

*Proposal 8: In mode-B of UEIBM, the second UL transmission is not subject to DRX active time.*

* Noted

RRC impact

*Chair: the following RRC related proposals can be discussed if time allows. Or, post meeting email discussions can be used to prepare for further discussions in the next meeting(s).*

R2-2500930 Impacts from other NR MIMO Phase 5 objectives Ericsson discussion

R2-2500218 Discussion on UE-initiated Beam Reporting and CSI enhancement Samsung discussion Rel-19 NR\_MIMO\_Ph5

R2-2501223 Consideration on the UEIBM ZTE Corporation discussion Rel-19 NR\_MIMO\_Ph5-Core

R2-2500103 RAN2 Aspects of the NR MIMO Nokia Corporation discussion Rel-19 NR\_MIMO\_Ph5-Core

R2-2500250 Discussion on UE-initiated Beam Reporting and CSI Enhancement CATT discussion Rel-19 NR\_MIMO\_Ph5-Core

R2-2500103 RAN2 Aspects of the NR MIMO Nokia Corporation discussion Rel-19 NR\_MIMO\_Ph5-Core

R2-2500180 Discussion on UE initiated beam reporting China Telecom discussion

R2-2500210 Discussion on UEI beam reporting OPPO discussion Rel-19 NR\_MIMO\_Ph5-Core

R2-2500218 Discussion on UE-initiated Beam Reporting and CSI enhancement Samsung discussion Rel-19 NR\_MIMO\_Ph5

R2-2500250 Discussion on UE-initiated Beam Reporting and CSI Enhancement CATT discussion Rel-19 NR\_MIMO\_Ph5-Core

R2-2500269 Discussion on modelling of UE-initiated beam report Xiaomi discussion Rel-19 NR\_MIMO\_Ph5-Core

R2-2500355 Discussion on UE-initiated/event-driven beam management vivo discussion Rel-19 NR\_MIMO\_Ph5-Core

R2-2500451 Discussion on UE-initiated/event-driven beam management SHARP Corporation discussion NR\_MIMO\_Ph5-Core

R2-2500636 Discussion on UEIBR Lenovo discussion Rel-19

R2-2500826 Discussion on UEI beam reporting impact LG Electronics Inc. discussion Rel-19 NR\_MIMO\_Ph5-Core

R2-2500930 Impacts from other NR MIMO Phase 5 objectives Ericsson discussion

R2-2501025 Discussion on UE-initiated/event-driven beam management CMCC discussion Rel-19 NR\_MIMO\_Ph5-Core

R2-2501167 Discussion on UE Initiated Beam Report Qualcomm Incorporated discussion

R2-2501176 Enhancements for UE-initiated/event-driven beam management Huawei, HiSilicon discussion Rel-19 NR\_MIMO\_Ph5-Core

R2-2501223 Consideration on the UEIBM ZTE Corporation discussion Rel-19 NR\_MIMO\_Ph5-Core

## 8.19 NR Others

Tdoc limit: 1

Contributions addressing LS from RAN4 R4-2420410 and any RAN4 LSs not related to any of the AIs above.

On UE capability for FDD-FDD inter-band CA

R2-2500041 LS on UE capability for FDD-FDD inter-band CA simultaneous Rx/Tx (R4-2420410; contact: CATT) RAN4 LS in Rel-19 NR\_CADC\_SUL\_R19 To:RAN2 Cc:RAN1

* ?? Noted

R2-2500229 Discussion on FDD-FDD inter-band CA simultaneous RxTx (LS R4-2420410) CATT, Huawei, HiSilicon, China Telecom, China Unicom discussion Rel-19 NR\_CADC\_SUL\_R19

*Proposal 1: RAN2 to confirm that the 2UL/2DL inter-band FDD-FDD CA\_n5-n8 with the scheduling restriction of non-concurrent n5 DL and n8 UL is feasible, and there is no RAN2 spec impact (i.e., the necessary scheduling restriction can be all up to network implementation).*

*Proposal 2: For a FDD-FDD inter-band NR CA band combination, define per BC UE capabilities to indicate:*

*1) For each band pair (X, Y) in this band combination, whether simultaneous transmission of band X and reception of band Y is supported;*

*2) For each band pair (X, Y) in this band combination, whether simultaneous transmission of band Y and reception of band X is supported.*

*Proposal 3: RAN2 to send out a reply LS with RAN2 agreements.*

R2-2500230 DRAFT Reply LS on UE capability for FDD-FDD inter-band CA simultaneous RxTx CATT LS out Rel-19 NR\_CADC\_SUL\_R19 To:RAN4 Cc:RAN1

R2-2500113 Discussion on n5-n8 simultaneous operation (R4-2420410) OPPO discussion Rel-19 NR\_CADC\_SUL\_R19

*Proposal 1 R2 discuss whether there is a need to define capability bits for 2UL/2DL CA\_n5-n8 case, considering so far simultaneous (n8UL, n5DL) is anyway not supported.*

*Proposal 2 If R2 decides to define capability bit for 2UL/2DL CA\_n5-n8 case, and if R2 decides to rely on existing simultaneousRxTxInterBandCA to cover FDD-FDD case, extend it in a way that it is present only if the concerned FDD-FDD BC includes (n5, n8) band pair, and when simultaneous (n8UL, n5DL) is supported.*

*Proposal 3 If R2 decides to define capability bit for 2UL/2DL CA\_n5-n8 case, and if R2 decides to rely on existing - simultaneousRxTxInterBandCAPerBandPair to cover FDD-FDD case, extend it in a way that the bit for the concerned band pair (n5, n8) indicates 0 if the simultaneous (n8UL, n5DL) is not supported, or 1 if it is supported (in both case, assuming simultaneous (n8DL, n5UL) is supported).*

R2-2500932 On UE capability for FDD-FDD inter-band CA simultaneous RxTx Ericsson discussion

*Proposal 1 Inform RAN4 that enforcing non-simultaneous UL and DL to existing FDD-FDD band combinations would cause backwards compatibility issues, and thus it is expected that such restriction is limited to band combinations defined onwards and not applicable to already existing band combinations.*

*Proposal 2 FDD-FDD band combinations where simultaneous UL and DL is not possible due to overlapping bands can be handled by NW implementation, as long as this restriction is limited to band combinations defined onwards and not applicable to already existing band combinations.*

*Proposal 3 RAN2 assumes that, if there are other cases defined in the future, they would also be a single FDD-FDD band pair. If there is an intention of any different combination, then RAN2 may need to discuss it more on the signaling solutions for this non-simultaneous transmission (including the case of a single FDD-FDD band pair).*

*Proposal 4 The restriction on non-simultaneous UL and DL for CA\_n5-n8 is expected to be captured in RAN4 specifications.*

R2-2501191 Capability signalling for overlapping FDD-FDD inter-band CA Nokia discussion Rel-19 NR\_CADC\_SUL\_R19

R2-2501225 Consideration on UE capability for FDD-FDD inter-band CA Simultaneous Rx/Tx ZTE Corporation discussion Rel-19 NR\_CADC\_SUL\_R19

On SSB position restrictions for less-than-5MHz Scells

R2-2500040 LS on SSB position restrictions for less-than-5MHz Scells (R4-2420383; contact: Qualcomm) RAN4 LS in Rel-19 NR\_FR1\_lessthan\_5MHz\_BW\_Ph2-Core To:RAN2 Cc:RAN1

R2-2500950 SSB position restrictions for less-than-5MHz SCells Qualcomm Incorporated CR Rel-18 38.331 18.4.0 5249 - F NR\_FR1\_lessthan\_5MHz\_BW-Core

On Ku band numerology

R2-2500034 LS on Ku band numerology (R4-2419902; contact: Rumney Telecom) RAN4 LS in Rel-19 NR\_NTN\_Ku\_bands-Core To:RAN1, RAN2 Cc:RAN

R2-2500087 Discussion on RAN4 LS on Ku Band Numerology vivo discussion Rel-19 NR\_NTN\_Ku\_bands-Core

R2-2500694 Discussion on Ku band numerology Huawei, HiSilicon discussion Rel-19 NR\_NTN\_Ku\_bands-Core

R2-2500937 Draft Reply LS on Ku band numerology THALES LS out Rel-19 NR\_NTN\_Ku\_bands-Core To:RAN4 Cc:RAN1, RAN

R2-2500979 Reply LS on Ku band numerology Eutelsat Group LS out Rel-19 NR\_NTN\_Ku\_bands-Core To:RAN4 Cc:RAN, RAN1

Other aspects (from other WGs than R4)

R2-2500047 LS on Location service of UEs served by MWAB (S2-2412625; contact: Huawei) SA2 LS in Rel-19 VMR\_Ph2 To:RAN3 Cc:RAN2

R2-2500051 LS on energy saving indication from CN to RAN (S2-2413034; contact: Ericsson) SA2 LS in Rel-19 EnergySys To:RAN2, RAN3

R2-2500055 LS on Time Synchronization for MBS (S4-242169; contact: Qualcomm) SA4 LS in Rel-19 FS\_AMD To:SA2, RAN2

R2-2500066 Reply LS on Time Synchronization for MBS (S2-2501327; contact: Ericsson) SA2 LS in Rel-19 FS\_AMD To:SA4, RAN2

## List of post meeting email discussions

*Template (will be deleted in the final report)*

* [AT129][20x][MIMOevo/LPWUS/SBFD/MIMO\_Ph5/NR\_Others] Proposals for xxxxx (xxxx)

Scope: xxx

 Intended outcome: Summary/Proposals in R2-25xxxxx for xxxx.

 Deadline: xxx

* [Post129][20x][MIMOevo/LPWUS/SBFD/MIMO\_Ph5/NR\_Others] xxxxx (xxxx)

Scope: xxx

Intended outcome: Summary/Proposals for xxxx

Deadline: xxx