3GPP TSG-RAN WG2 Meeting #128 draft R2-2410912

Orlando, USA, Nov. 18th – 22nd , 2024

Source: RAN2 Vice Chairman (CATT)

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

## Organizational email discussion

* [AT128][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))

LS on two TA

R2-2409510 LS on TDD UL/DL Configuration for Two TA (R1-2409179; contact: Ericsson) RAN1 LS in Rel-18 NR\_MIMO\_evo\_DL\_UL-Core To:RAN2

* Noted

R2-2410397 On LS 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 in IE BWP-UplinkCommon s shown in TP1.*

*Proposal 2 Clarify in 38.306 that a UE supporting capability multiDCI-InterCellMultiTRP-TwoTA-r18 also supports TDD UL/DL configuration.*

DISCUSSION

P1

* ZTE agree with the intention but think TP has some problems in filed description.
* CATT think it is better to ext the existing additionalRACH-perPCI-ToAddModList-r18. Ericsson think it may be misleading to have tdd ul dl config parameters in RACH configuration.
* CATT think if we use Ericsson proposal then maxNrofAdditionalTDDConfigs is not defined.

P2

* ZTE think it is not needed and think this is detail. QC, LG E agree.
* Intention of P1 is agreeable, maxNrofAdditionalTDDConfigs needs to be added. CR will be discussed offline and checked in CB session.
* P2 is not pursued.
* [AT128][204][MIMOevo] RRC CR on TDD UL/DL Configuration for Two TA (Ericsson)

 Intended outcome: Agreeable CR on TDD UL/DL Configuration for Two TA in R2-2410954.

 Deadline: Before CB

R2-2410954 Correction on TDD UL/DL Configuration for Two TA

DISCUSSION

Ericsson think this is in general agreeable but companies can further check the details due to late uploading.

Chair: we will check online (in the main session) whether this is agreeable.

PHR

*Chair: plan is to discuss PHR related contributions in offline*

R2-2410528 Correction on PHR for MIMO STx2P multi-panel scheme Samsung, LG, Huawei, CATT, Ericsson CR Rel-18 38.321 18.3.0 1959 1 F NR\_MIMO\_evo\_DL\_UL-Core R2-2409024

* The CR is agreed.

R2-2410175 Correction on PHR for MIMO ASUSTeK CR Rel-18 38.321 18.3.0 1991 - F NR\_MIMO\_evo\_DL\_UL-Core

* The CR is not pursed.

R2-2410625 Clarification to 38.321 on R17 PHR MAC CE for mTRP PUSCH Repetition ZTE Corporation CR Rel-18 38.321 18.3.0 2008 - F NR\_MIMO\_evo\_DL\_UL-Core

* The CR is postponed.
* [AT128][201][MIMOevo] Proposals/CRs for PHR (Samsung)

Scope: Discuss PHR related proposals for MIMOevo

 Intended outcome: Proposals in R2-2410951 for CB, updated CR(s) in R2-24xxxxx.

 Deadline: Before CB.

R2-2410951 Report of [AT128][201][MIMOevo] Proposals/CRs for PHR

* Noted

*Proposal 1: Change 1 in R2-2410175 is not needed. Discuss whether Change 2 is needed.*

*Proposal 2: RAN2 understands a MAC entity is not be configured with twoPHRmode if in this MAC entity no serving cell is configured with Rel-17 mTRP PUSCH repetition or Rel-18 mTRP STx2P multi-panel scheme.*

*Proposal 3: Agree CR R2-2410528.*

DISCUSSION

P1

* LG E think P2 is right but not essential.
* ~~P1 is agreed.~~

P2

* CATT think ZTE has a point and think we can postpone. LG E think it is meaningful to hear more views form other NW vendors. Samsung think we can CB next meeting.
* QC do not think this is valid issue. Ericsson do not think this is an important issue.

8Tx

R2-2410173 Discussion on supporting 8Tx in MAC specification ASUSTeK discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

* Noted

R2-2410174 Correction on supporting 8Tx in MAC specification ASUSTeK CR Rel-18 38.321 18.3.0 1990 - F NR\_MIMO\_evo\_DL\_UL-Core

* Not treated

R2-2410624 Harmonization of 8Tx in MAC specification ZTE Corporation discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

=> Revised in R2-2411076

R2-2411076 Harmonization of 8Tx in MAC specification ZTE Corporation discussion Rel-18 NR\_MIMO\_evo\_DL\_UL-Core

* Noted

 Modelling method#1: For 8Tx, One uplink grant and One HARQ process for 2TB transmission (keep the agreements achieved in RAN2#127bis meeting as it is )

 Modelling method#2: For 8Tx, Two uplink grants Two HARQ processes with one HARQ process Id for 2TB transmission.

DISCUSSION

* Ericsson support ASUSTeK proposal and think it is similar in DL.
* LG E think there is one more option, 2 grant, 1 harq process and 2 harq buffer, and think if 2 TB is generated and then 2 HARQ buffer are needed. Xiaomi agree, and think for separate HARQ retransmission we need 2 HARQ process.
* QC think R1 want to have 2 TB and we need 2 HARQ buffer and think in this case it is better to have 2 HARQ process (so agree with ZTE method #2). QC think in R1, DCI only contains 1 HARQ ID and it is up to UE implementation how to associate the ID with the 2 HARQ process.
* CATT think 2 HARQ buffer is needed, and regarding modelling CATT think both methods work.
* CATT think the problem is from R1 point of view there is only one HARQ ID and this needs careful review (300, RRC, etc.). Ericsson wonders what is the RRC change. CATT think in RRC we now have # of UL HARQ processes so there may be impact. HW think there is no RRC impact.
* HW think it is important to make it as simple as possible, and think method 2 is better. Apple agree. Nokia agree.
* MAC rapp think method 2 is better to minimize the MAC spec impact.
* Ericsson think currently it is one DCI scheduling the PUSCH so it is one grant.

?? For 8Tx 2TB transmission, we assume the following from MAC point of view: two uplink grants for two HARQ processes, one HARQ process ID, 2 HARQ buffer. Detailed changes to MAC will be discussed in offline.

* [AT128][202][MIMOevo] Discuss on the modelling and review the MAC CR for 8Tx 2TB if the modelling is agreeable (ASUSTeK, ZTE)

Scope: Discuss the modelling, and if there is an agreeable modelling, prepare and review the MAC CR. Can also check if any change to RRC is needed.

 Intended outcome: Summary in R2-2410952 and agreeable CR in R2-24xxxxx.

 Deadline: Before CB

R2-2410952 Report of [AT127bis][202][MIMOevo] Discuss on the modelling and review the MAC CR for 8Tx 2TB if the modelling is agreeable (ASUSTeK, ZTE)

* Noted
* The following is used as baseline for drafting an LS to R1

**Q1**

 **RAN2 made the following assumption regarding how to model UL 8Tx 2TB in MAC:**

|  |
| --- |
| **For 8Tx 2TB transmission, we assume the following from MAC point of view: two uplink grants scheduled by one DCI for two HARQ processes, one HARQ process ID, 2 HARQ buffer.** |

**Ask for RAN1’s feedback on the above assumption**

**Q2**

**Ask RAN1 whether ensuring a 2-TB generation is needed in NR 8Tx**

* [POST128][006][ MIMOevo] LS on 8Tx 2TB (Samsung)

 Intended outcome: Approve the LS

 Deadline: short

On simultaneousU-TCI-UpdateListx

R2-2409715 Correction on simultaneousU-TCI-UpdateListx CATT, Ericsson CR Rel-18 38.331 18.3.0 5111 - F NR\_MIMO\_evo\_DL\_UL-Core

* Send LS to R1 to ask how to differentiate the different cases of sDCI mTRP, mDCI mTRP and sTRP
* CR is postponed
* [AT128][203][MIMOevo] LS on differentiation of sDCI mTRP, mDCI mTRP and sTRP (CATT)

 Intended outcome: Draft LS in R2-2410953.

 Deadline: Before CB

R2-2410953 [Draft] LS on differentiation of sDCI mTRP, mDCI mTRP and sTRP

* Noted

DISCUSSION

* HW, ZTE think Q2 part is not so clear.
* Samsung think we can further discuss the Q2 and we can have a short email disc.
* [POST128][007][ MIMOevo] LS on differentiation of sDCI mTRP, mDCI mTRP and sTRP (CATT)

 Intended outcome: Approve the LS

 Deadline: short

## 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.

Spec editor assignment suggested by WI Rapporteur

38.300 => Ericsson

38.321 => Apple

38.331 => vivo

38.306 => Huawei

38.304 => CATT

37.340 => ZTE

### 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 and entry/exit condition for LP-WUS monitoring

Subgrouping

*Related proposals*

R2-2410841 Discussion on LP-WUS for IDLE/INACTIVE state NTT DOCOMO, INC. discussion Rel-19

* Noted

*Observation 1. It is up to SA2 to discuss whether the UE prevents from reporting UE capability for CN subgrouping ID feature when the UE has an emergency PDU session.*

*Proposal 3. Discuss whether any solution is needed to minimize an additional delay to page a UE caused by subgrouping for LP-WUS.*

DISCUSSION

* Xiaomi do not think any enh is needed, and think it is similar to the case when we discuss PEI.
* Ericsson also think the same topic has been discussed in PEI, and think we should follow the same approach. Ericsson assume CT1/SA2 will not handle this. Ericsson think in R2 we can further discuss the case of UE-ID based subgroup.
* Vodafone think wonders the case for UE ID based subgroup.
* CATT share the understanding of O1, for P3, CATT think it is valid to discuss this issue since LPWUS is different in the sense that it requires a large time period to switch to MR.
* Vivo think there seems to be common understanding for CN-based subgroup in R2 we do not need to discuss, and for UE-ID based there may be some solution to discuss. NEC agree to further discuss.
* Nokia think there is no need to further discuss solutions for UE-ID based subgrouping.
* FFS whether/how to handle the case for UE-ID based subgrouping when the UE has an emergency PDU session.

R2-2410085 LP-WUS in Idle and Inactive Ericsson discussion Rel-19 NR\_LPWUS-Core R2-2409058

* Noted

*Proposal 12 The UE does not monitor PEI after LP-WUS, when the UE supports both features and both features are configured in SIB.*

*Proposal 13 In case the UE and NW support LP-WUS and PEI, then only LP-WUS is used for paging.*

DISCUSSION

* Interdigital think R1 already decided for the case that it is left to UE implementation whether to monitor PEI. ZTE, HW agree. QC agree and think the coverage of PEI and LPWUS signal may be different.
* LG E do not agree and think we cannot prevent UE from using both features, think it is useful to reduce false alarm if NW properly assign the subgroup IDs for both features. NEC agree.

*Further discussions on the formula*

R2-2410606 Procedure and Configuration of LP-WUS in RRC Idle Inactive Mode Samsung discussion Rel-19

* Noted

*Proposal 2. LP WUS subgroup ID based on UE\_ID is determined as follows:*

*LP WUS subgroup ID = (floor (UE\_ID/(N\*Ns)) mod LPWUSsubgroupsNumForUEID) + (LPWUSsubgroupsNumPerPO - LPWUSsubgroupsNumForUEID)*

*- LPWUSsubgroupsNumForUEID: number of LPWUS subgroups for UE\_ID based LPWUS subgrouping in a PO, which is broadcasted in system information*

*- LPWUSsubgroupsNumPerPO: number of LPWUS subgroups per PO, which is broadcasted in system information*

R2-2409718 LP-WUS in RRC\_IDLE/INACTIVE CATT discussion Rel-19 NR\_LPWUS-Core

* Noted

*Proposal 3: RAN2 discuss which option is adopted:*

*- Option 1: The subgrouping number for UE\_ID based PEI subgrouping is considered in the formula for UE\_ID based LP-WUS subgrouping.*

*- Option 2: The formula for UE\_ID based PEI subgrouping is reused.*

DISCUSSION on P3 in R2-2409718

* Xiaomi prefer O1, and think false alarm reduction is possible by assigning different subgroup IDs for PEI and LPWUS. NEC, CMCC agree.
* HW prefer fixed value for K in option 1.
* ZTE also support O1, and think O2 is a special case for O1.
* Interdigital slightly prefer O2 since it has less spec impact. Lenovo agree.
* NEC think there is efficiency issue with O2.
* LG E think with O2 it is also possible for NW to assign different subgroup IDs, and think O2 is simpler. Lenovo agree.
* Ericsson think if we support this then the formular cannot be exactly the same, and think we need a new formular. Vivo agree.
* CMCC want to have the flexibility of having different subgroups for both.
* QC not sure about the gain due to lack of evaluations, so think O2 the simpler way is preferred. Samsung agree. Samsung think there are evaluations in R1.
* Samsung think the O1 has the issue of UE id length.
* NEC think we can go with CATT P3 and in the next meeting we down-select.
* FFS on the following options

- Option 1: The subgrouping number for UE\_ID based PEI subgrouping is considered in the formula for UE\_ID based LP-WUS subgrouping.

- Option 2 The subgrouping number for UE\_ID LPWUS subgrouping includes an offset K which is configurable or fixed.

- Option 3: The formula for UE\_ID based PEI subgrouping is reused.

**Agreements on subgrouping**

|  |
| --- |
| * FFS whether/how to handle the case for UE-ID based subgrouping when the UE has an emergency PDU session.
* FFS on the following options

- Option 1: The subgrouping number for UE\_ID based PEI subgrouping is considered in the formula for UE\_ID based LP-WUS subgrouping.- Option 2 The subgrouping number for UE\_ID LPWUS subgrouping includes an offset K which is configurable or fixed. - Option 3: The formula for UE\_ID based PEI subgrouping is reused. |

Further discussions on R1 LS in R2-2407921/ R1-2407559

*2 contributions below are moved from 8.4.1*

R2-2409989 On LR and MR operating frequencies and the answer to RAN1 LS VODAFONE,VIVO, Deutsche Telekom discussion Rel-19

* Noted

R2-2409990 DRAFT Reply LS to R2-2409157/R1-2407559 VODAFONE Group Plc LS out Rel-19 To:RAN Plenary, RAN1 Cc:RAN4

* Noted

R2-2410670 Further considerations on LP-WUS operation in IDLE INACTIVE mode CMCC discussion Rel-19 NR\_LPWUS-Core

* Noted

*Proposal 4: From RAN2 perspective, UE may not support LP-WUS reception on all the bands that supported by the UE.*

*Proposal 5: If UE does not support LP-WUS reception on the frequency of MR, LP-WUS reception can be performed on the carrier supported by LR, while paging monitoring/measurement/access is performed on MR.*

R2-2409949 Procedure and configuration of LP-WUS in RRC\_IDLE/INACTIVE Apple discussion Rel-19 NR\_LPWUS-Core

* Noted

*Proposal 8: Send LS reply to RAN1 and RAN4 on the following identified issues:*

*- For intra-frequency scenario, there may be congestion issue on LP-WUS;*

*But it can be mitigated if only LP-WUS capable UEs prioritize to camp on the LP-WUS cell.*

*- For inter-frequency scenario, the following issues are identified:*

*o The different DL timing between MR and LR causes the LP-WUS/LP-SS reception to malfunctions.*

*o The different radio quality between MR and LR causes the serving measurement offloading/relaxation to malfunction.*

*o Whether and how to support the associate the LP-WUS transmission on one frequency to PO in multiple cells needs to study.*

*Proposal 9: RAN2 LP-WUS discussion focuses on intra-frequency scenario, and the support of inter-frequency scenario is deprioritized in R19.*

*Proposal 10: Introduce the LP-WUS specific frequency priority for the cell reselection for the LP-WUS capable UE. (To address the potential congestion issue on LP-WUS frequency in scenario 1)*

*Proposal 11: RAN2 to consider the draft reply LS in Annex.*

DISCUSSION

* VDF think R1 want to support the inter-freq case, so has doubt on Apple proposal to prioritize intra-freq case. Apple clarifies it does not mean we exclude inter-freq, but to start intra-freq as baseline.
* Rapp suggest in R2 we focus on how to reply the LS, e.g., we can discuss what are the issues with intra- and inter-freq case, and think it is for RP/R1 to make the decision. LG E agree.
* LG E think Apple contribution listed many R1/R4 aspects and think we should focus on R2 issues. Interdigital agree.
* Xiaomi think from R2 point of view we need to think about how to model the different cells on the different frequencies. Xiaomi prefer to confirm the R4 agreement to have intra-freq as baseline. Samsung, Interdigital, Lenovo agree.
* Samsung support understanding in Apple contribution. CATT share the view.
* ZTE think for inter-freq case UE should go back to MR band to receive paging.
* Qualcomm think inter-freq case impact a lot of things, so suggest to stick to intra-case. Ericsson has different understanding, and think for PEI UE can indicate which band(s) it support PEI.
* Ericsson not sure if CMCC proposal is feasible.
* VDF think in R1 LS they don’t not mention intra-freq and inter-freq cases, just different bands.
* VDF do not think having intra-freq as baseline is acceptable.
* Ericsson think we do not need priority specifically introduced for LPWUS UEs, and can rely on other mechanism.
* Rapp propose to discuss the issues if we do not support or support inter band operation of MR and LR.
* [AT128][205][LPWUS] R2 impact analysis and draft reply LS on LP-WUS supporting in different bands (VODAFONE)

Scope: Discuss and align understanding on potential R2 impact if we do not support or support inter band operation of MR and LR. Can also discuss whether the LS is sent to RP as well.

 Intended outcome: Summary in R2-2410955, Draft LS if available in R2-2410956

 Deadline: Before CB

R2-2410955 Minutes of offline discussion: [AT128][205][LPWUS] R2 impact analysis and draft reply LS on LP-WUS supporting in different bands (VODAFONE)

* Noted

R2-2410956 DRAFT Reply LS to R2-2409157/R1-2407559

* Noted

DISCUSSION

* Ericsson do not see a need/purpose to cc RP, as there is no action given to RP. Samsung, ZTE, Interdigital, Xiaomi, Nokia agree. Xiaomi and Ericsson think we are not sure whether there is an issue to solve. CMCC do not want to CC RP and think R4 do not CC RP.
* Vodafone think we need to cc RP, want to inform RP about R2 status. HW, vivo ok to CC RP.
* We will use the following to draft the LS. The LS is not CC to RP.

**State of discussions in RAN WG2:**

During RAN WG2 discussions, many companies raised concerns that if LP-Receivers support only subset of the bands supported by the main receiver and if LP-WUS, Paging and RACH are executed in the LP-WUS bands it might lead to overload of these bands if the NW set the LP-WUS frequency as a higher priority. This will impact user performance and decrease the utilisation of higher frequency bands. In order to ensure the LP-WUS capable UEs are camping on the band LR implemented, the NW would need to offload LP capable UEs to LR band.

On the other hand if the NW operator does not offload the UEs to the band LP receiver supports, only a subset of UEs would profit from LP-WUS feature.

Some companies do not see that overload problem would occur as the NW implementation can control the offload of the UEs to the lower bands in dedicated way.

In regards to the overload problem, RAN WG2 has not finished evaluations and would need to study the solutions more.

**Actions:**

RAN2 kindly asks RAN WG1 and WG4 to take the information above into account once deciding on the support of the use case mentioned above.

* The LS is approved (unseen) in R2-2410957.

R2-2409718 LP-WUS in RRC\_IDLE/INACTIVE CATT discussion Rel-19 NR\_LPWUS-Core

R2-2409761 Discussion on LP-WUS WUR in RRC\_IDLE INACTIVE vivo discussion Rel-19 NR\_LPWUS-Core

R2-2409871 General considerations on the procedure for RRC\_IDLE\_INACTIVE Xiaomi Communications discussion

R2-2409902 LP-WUS in RRC\_IDLE INACTIVE NEC discussion Rel-19 NR\_LPWUS-Core

R2-2409921 Discussion on procedure and configuration of LP-WUS in RRC\_IDLE/INACTIVE Huawei, HiSilicon discussion Rel-19

R2-2409924 LP-WUS operation in RRC\_IDLE and RRC\_INACTIVE LG Electronics Inc. discussion Rel-19 NR\_LPWUS-Core

R2-2409949 Procedure and configuration of LP-WUS in RRC\_IDLE/INACTIVE Apple discussion Rel-19 NR\_LPWUS-Core

R2-2410085 LP-WUS in Idle and Inactive Ericsson discussion Rel-19 NR\_LPWUS-Core R2-2409058

R2-2410119 Discussion on LP-WUS procedure and configuration OPPO discussion Rel-19 NR\_LPWUS-Core

R2-2410166 Procedure and configuration of LP-WUS for IDLE and INACTIVE mode ZTE Corporation, Sanechips discussion Rel-19 NR\_LPWUS-Core

R2-2410377 RAN2 aspects on LP-WUS/WUR in RRC Idle/Inactive mode Sony discussion Rel-19 NR\_LPWUS-Core

R2-2410412 Discussion on IDLE/INACTIVE procedures for LP-WUS Tejas Network Limited discussion Rel-19

R2-2410509 Discussion on LP-WUS operation in RRC\_IDLE/INACTIVE modes InterDigital, Inc. discussion Rel-19 NR\_LPWUS-Core

R2-2410555 LP-WUS in IDLE and INACTIVE Nokia discussion Rel-19 NR\_LPWUS-Core

R2-2410606 Procedure and Configuration of LP-WUS in RRC Idle Inactive Mode Samsung discussion Rel-19

R2-2410632 Discussion on LP-WUS in RRC\_IDLE and RRC\_INACTIVE Sharp discussion Rel-19

R2-2410670 Further considerations on LP-WUS operation in IDLE INACTIVE mode CMCC discussion Rel-19 NR\_LPWUS-Core

R2-2410683 Discussion on LP-WUS in RRC\_IDLE/INACTIVE HONOR discussion Rel-19 NR\_LPWUS-Core

R2-2410730 LP-WUS operation in IDLE/Inactive state Qualcomm Incorporated discussion NR\_LPWUS-Core

R2-2410798 Procedure and Configuration of LP-WUS in RRC Idle/ Inactive Lenovo discussion NR\_LPWUS-Core

R2-2410841 Discussion on LP-WUS for IDLE/INACTIVE state NTT DOCOMO, INC. discussion Rel-19

R2-2410858 On LP-WUS paging monitoring considerations Nordic Semiconductor discussion Rel-19 Late

### 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 and neighbor cell measurements relaxation

R2-2409925 RRM relaxation and RRM offloading LG Electronics Inc. discussion Rel-19 NR\_LPWUS-Core

* Noted

*Proposal 4 [For case #3] The entry condition for RRM relaxation is ‘if serving cell quality measured by MR is higher than relaxation threshold, e.g. RSRP and/or RSRQ’. The LR measurement is not considered.*

*Proposal 5 [For case #3] No separate exit condition for RRM relaxation. If the entry condition for RRM relaxation is not met, UE stops the RRM relaxation, i.e. performs legacy measurements.*

*Proposal 6 [For case #3] If the condition for RRM relaxation is met, UE performs serving cell measurements using only MR with relaxed requirement.*

*Proposal 7 [For case #3] If the condition for RRM relaxation is met, UE performs neighbor cell measurements using MR with relaxed requirement according to the existing measurement rules for cell re-selection.*

*Proposal 8 The condition for RRM offloading/relaxation is not associated with the conditions for using LP-WUS.*

DISCUSSION

P4

* Ericsson not sure what is the motivation of R4 case #3. Ericsson think LPWUS UE has the same requirements for other UEs when it comes to neighbour cell measurement, and think LP-WUS entry/exit is not related to neighbour cell measurement.
* Nokia think it is difficult for NW to configure the threshold if we only allow MR-based metric, so prefer to also have LR based metric.
* Samsung want to clarify whether this is for new case, LG E think it is not new but it is case 3 in R4. Samsung ask whether for case 3 it means same condition for both serving and neighbour relx. LG E prefer the same condition. Samsung prefer to have different conditions for them.
* Apple think we only need single condition.
* OPPO think it is up to R4 whether the entry condition for serving cell RRM measurement relaxation is the same as neighbour cell RM measurement relaxation.
* HW agree with LG E. HW see no reason to separate the entry condition for serving cell RRM measurement relaxation and neighbour cell RM measurement relaxation.
* HW wonders how could the LR measurement be used for entry condition since UE may not have LR results before entering case 3.

P5

* CATT think we only agreed MR-based condition, and if we also have LR-based condition then we do need separate exit condition. CATT suggest to wait.
* Sony think it is meaningful to consider LR based condition. QC agree and think LR-based condition should be included.
* HW also think exit condition is based on LR.
* The entry condition for serving cell RRM relaxation is at least ‘if serving cell quality measured by MR is higher than relaxation threshold, e.g. RSRP and/or RSRQ’. FFS if LR measurement is needed.
* FFS on exit condition for serving cell RRM relaxation, e.g., whether a separate exit condition other than ‘not fulfilling the entry condition’ is needed, or whether exit condition include MR and/or LR-based measurements
* FFS if the entry condition for serving cell RRM measurement relaxation is the same as neighbour cell RRM measurement relaxation.

R2-2410732 LP-WUS RRM measurement relaxation and offloading Qualcomm Incorporated discussion NR\_LPWUS-Core

* Noted

*Proposal 5 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*

*Proposal 6 The condition for leaving offloading mode (fully or partially): when any of LR or MR measurement is below a threshold defined for no offloading, UE should leave offloading mode (fully or partially).*

R2-2409592 Further discussion on the criteria for RRM measurement relaxation and offloading Huawei, HiSilicon discussion Rel-19 NR\_LPWUS-Core

* Noted

*Proposal 4: Separate threshold(s) should be introduced for RRM measurement relaxation (RAN4 case#3), compared to the threshold(s) of Rel-16 neighbor cell RRM measurement relaxation, i.e., these two features should be decupled.*

*Proposal 5: The criteria for entry/exit condition of RRM measurement relaxation is the same as the criteria for entry/exit condition of LP-WUS monitoring.*

DISCUSSION

P5

* Samsung think these are different procedures so no need to have same condition. Samsung do not support P5. Nokia, Lenovo share this view.
* Apple agree with the intention since case 3 is when LR is ON.
* Xiaomi agree with P5 since there is no PS gain if UE only monitor LPWUS but not doing RRM relx. NEC, ZTE agree.

**Agreements on RRM measurement relaxation**

* The entry condition for serving cell RRM relaxation is at least ‘if serving cell quality measured by MR is higher than relaxation threshold, e.g. RSRP and/or RSRQ’. FFS if LR measurement is needed.
* FFS on exit condition for serving cell RRM relaxation, e.g., whether a separate exit condition other than ‘not fulfilling the entry condition’ is needed, or whether exit condition include MR and/or LR-based measurements
* FFS if the entry condition for serving cell RRM measurement relaxation is the same as neighbour cell RRM measurement relaxation.

R2-2409592 Further discussion on the criteria for RRM measurement relaxation and offloading Huawei, HiSilicon discussion Rel-19 NR\_LPWUS-Core

R2-2409719 RRM Relaxation and Offloading in RRC\_IDLE/INACTIVE CATT discussion Rel-19 NR\_LPWUS-Core

R2-2409762 Discussion on RRM measurement relaxation and offloading in RRC\_IDLE/INACTIVE vivo discussion Rel-19 NR\_LPWUS-Core

R2-2409872 Discussion on RRM measurement relaxation for RRC\_IDLE\_INACTIVE Xiaomi Communications discussion

R2-2409903 LP-WUS measurement relaxation and offloading NEC discussion Rel-19 NR\_LPWUS-Core

R2-2409925 RRM relaxation and RRM offloading LG Electronics Inc. discussion Rel-19 NR\_LPWUS-Core

R2-2409950 RRM measurement relaxation and offloading in RRC\_IDLE/INACTIVE Apple discussion Rel-19 NR\_LPWUS-Core

R2-2410086 LP-WUS and RRM measurements Ericsson discussion Rel-19 NR\_LPWUS-Core R2-2409059

R2-2410120 Discussion on RRM measurement in RRC IDLE and INACTIVE OPPO discussion Rel-19 NR\_LPWUS-Core

R2-2410167 RRM measurement relaxation and offloading in RRC\_IDLE and RRC\_INACTIVE mode ZTE Corporation, Sanechips discussion Rel-19 NR\_LPWUS-Core

R2-2410273 RRM measurement relaxation and offloading in RRC\_IDLE/INACTIVE Lenovo discussion Rel-19

R2-2410341 Discussion on RRM measurement relaxation and offloading in RRC\_IDLE INACTIVE CMCC discussion Rel-19 NR\_LPWUS-Core

R2-2410378 Discussion on RRM aspects for LP-WUS/WUR Sony discussion Rel-19 NR\_LPWUS-Core

R2-2410510 Discussion on RRM measurement relaxation and offloading InterDigital, Inc. discussion Rel-19 NR\_LPWUS-Core

R2-2410556 RRM measurement relaxation in RRC\_IDLE/INACTIVE Nokia discussion Rel-19 NR\_LPWUS-Core

R2-2410607 RRM measurement relaxation and offloading in RRC Idle Inactive Mode Samsung discussion Rel-19

R2-2410633 Discussion on RRM measurement relaxation and offloading Sharp discussion Rel-19

R2-2410694 RRM measurement relaxation and offloading in RRC\_IDLE/INACTIVE China Telecom discussion

R2-2410732 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.

Option 1-2 (Handling of drx-onDurationTimer, periodic CSI/L1-RSRP reporting, etc.)

R2-2410405 LP-WUS in CONNECTED mode InterDigital discussion Rel-19 NR\_LPWUS-Core

* Noted

*Proposal 6: The drx-onDurationTimer is not started with Option 1-2 LP-WUS.*

R2-2409883 LP-WUS in RRC\_CONNECTED Nokia, Nokia Shanghai Bell discussion

* Noted

*Proposal 2: In option 1-2, drx-onDurationTimer is maintained.*

*Proposal 3: In option 1-2, the UE resumes start of the drx-onDurationTimer only after receiving a PDCCH while a newly introduced timer (entatively named drx-lpwusInactivityTimer) is running.*

DISCUSSION

* Ericsson think we do not follow legacy, and this is behaviour with a new timer. Ericsson think CSI report behaviour can be configured. LG E think in R1 they agreed to introduce such configuration.
* Xiaomi do not think drx-onDurationTimer needs to be started. HW agrees, since we use new timer to control pdcch monitoring. LG E agree. OPPO agree.
* Apple think intention of R1 is to follow DCP way.
* QC think R1 already agreed drx-onDurationTimer is not started. Lenovo agree.
* Sony think we do not need two timer running at the same time and think since we use the new timer.

R2-2409588 Discussing on LP-WUS monitoring in Connected mode Xiaomi discussion Rel-19 NR\_LPWUS-Core

* Noted

*Proposal 3 For Option 1-2, network can configure whether UE reports periodic CSI/L1-RSRP during the time given by the configured drx-onDurationTimer.*

*Proposal 5 For option 1-2, if UE receives DRX command MAC CE or Long DRX command MAC CE, UE stops the new timer triggered by LP-WUS.*

* The drx-onDurationTimer is not started with Option 1-2 LP-WUS.
* For Option 1-2, network can configure whether UE reports periodic CSI/L1-RSRP during the time given by the configured drx-onDurationTimer, for the case when UE is outside C-DRX active time.

P5

* NEC, Apple in general agree with P5.
* NEC want to confirm that whether Option 1-2 can be configured in case of short DRX. Nokia think this is separate discussion.
* Nokia, Interdigital, Lenovo agree.
* For option 1-2, if UE receives DRX command MAC CE or Long DRX command MAC CE, UE stops the new timer triggered by LP-WUS.

Option 1-1 and 1-2

R2-2409904 LP-WUS in RRC\_CONNECTED NEC discussion Rel-19 NR\_LPWUS-Core

* Noted

*Proposal-3: support both Option 1-1 and Option 1-2 simultaneously configured for the same UE, i.e., LP-WUS can be used to trigger both new active timer and legacy drx-onDurationTimer, when the new active timer and legacy drx-onDurationTimer is running, the UE monitors PDCCH.*

R2-2410634 Discussion on LP-WUS in RRC\_CONNECTED Sharp discussion Rel-19

* Noted

*Proposal 2: Don’t support Option 1-1 and Option 1-2 simultaneously configured for the same UE.*

* Don’t support Option 1-1 and Option 1-2 simultaneously configured for the same UE.

LP-WUS for CA and DC

R2-2409763 Discussion on LP-WUS WUR in RRC\_Connected vivo discussion Rel-19 NR\_LPWUS-Core

* Noted

*Proposal 8: For both option 1-1 and option 1-2 in NR-DC case, LP-WUS is configured separately in MCG and SCG, and LP-WUS could trigger the PDCCH monitoring of all activated serving cells within the same cell group.*

* Xiaomi fine with P8, think wording can improve. NEC fine with the proposal.
* Apple do not think for DC case NW can configured LPWUS for MCG and SCG at the same time, not ready to agree for DC case.
* LG E think DCP is not used for DC case, so prefer not to have LPWUS for DC case. Vivo think it can.
* QC wonders whether UE capability needs to be defined.

For both option 1-1 and option 1-2

* + - ?? The LP-WUS can ~~also~~ be configured ~~with secondary~~ per DRX group.
		- ?? In NR-DC case, LP-WUS can be configured separately in MCG and SCG, and LP-WUS could trigger the PDCCH monitoring of all activated serving cells within the same cell group.

R2-2410168 Procedures for LP-WUS in RRC\_CONNECTED ZTE Corporation, Sanechips discussion Rel-19 NR\_LPWUS-Core

* Noted

*Proposal 3a: The LP-WUS can be configured with secondary DRX group simultaneously.*

*Proposal 3b: When LP-WUS is configured with secondary DRX Group simultaneously, down select from the following options with an LS to RAN1 to inform our decision:*

* Option 1: one LP-WUS resource is configured per DRX group.*

* Option 2: one LP-WUS resource is configured per cell group, with indication in LP-WUS to indicate which DRX group is triggered*

*Proposal 4a: In NR-DC, LP-WUS is configured for MCG and LCG separately.*

*Proposal 4b: LP-WUS can be configured for MCG in NE-DC case, i.e. the MN is a gNB, and LP-WUS can be configured for SCG in EN-DC case, i.e. the SN is a gNB.*

**Agreements on LP-WUS in RRC\_CONNECTED**

|  |
| --- |
| * The drx-onDurationTimer is not started with Option 1-2 LP-WUS.
* For Option 1-2, network can configure whether UE reports periodic CSI/L1-RSRP during the time given by the configured drx-onDurationTimer, for the case when UE is outside C-DRX active time.
* For option 1-2, if UE receives DRX command MAC CE or Long DRX command MAC CE, UE stops the new timer triggered by LP-WUS.
* Don’t support Option 1-1 and Option 1-2 simultaneously configured for the same UE.
 |

R2-2409588 Discussing on LP-WUS monitoring in Connected mode Xiaomi discussion Rel-19 NR\_LPWUS-Core

R2-2409713 LP-WUS operation for RRC\_CONNECTED Mode LG Electronics Inc. discussion Rel-19 NR\_LPWUS-Core

R2-2409720 Analysis on LP-WUS for RRC\_CONNECTED Mode CATT discussion Rel-19 NR\_LPWUS-Core

R2-2409763 Discussion on LP-WUS WUR in RRC\_Connected vivo discussion Rel-19 NR\_LPWUS-Core

R2-2409883 LP-WUS in RRC\_CONNECTED Nokia, Nokia Shanghai Bell discussion

R2-2409904 LP-WUS in RRC\_CONNECTED NEC discussion Rel-19 NR\_LPWUS-Core

R2-2409951 Procedures for LP-WUS in RRC\_CONNECTED Apple discussion Rel-19 NR\_LPWUS-Core

R2-2410087 LP-WUS in Connected Ericsson discussion Rel-19 NR\_LPWUS-Core R2-2409060

R2-2410099 LP-WUS in CONNECTED mode China Telecom discussion Rel-19 NR\_LPWUS-Core

R2-2410121 Discussion on LP-WUS in RRC\_CONNECTED OPPO discussion Rel-19 NR\_LPWUS-Core

R2-2410168 Procedures for LP-WUS in RRC\_CONNECTED ZTE Corporation, Sanechips discussion Rel-19 NR\_LPWUS-Core

R2-2410319 Discussion on LP-WUS operation in CONNECTED mode CMCC discussion Rel-19 NR\_LPWUS-Core

R2-2410352 Discussion on LP-WUS for RRC\_CONNECTED mode Huawei, HiSilicon discussion Rel-19 NR\_LPWUS-Core

R2-2410379 Considerations on LP-WUS/WUR in RRC Connected mode Sony discussion Rel-19 NR\_LPWUS-Core

R2-2410405 LP-WUS in CONNECTED mode InterDigital discussion Rel-19 NR\_LPWUS-Core

R2-2410413 Discussion on CONNECTED mode procedures for LP-WUS Tejas Network Limited discussion Rel-19

R2-2410608 Procedures for LP-WUS in RRC Connected Mode Samsung discussion Rel-19

R2-2410634 Discussion on LP-WUS in RRC\_CONNECTED Sharp discussion Rel-19

R2-2410731 LP-WUS operation in CONNECTED state Qualcomm Incorporated discussion NR\_LPWUS-Core

R2-2410814 LP-WUS in RRC Connected Mode Lenovo 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..

### 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.

Procedure and configuration related to RA resource selection

*General*

R2-2409680 SBFD RACH configuration for initial random access Charter Communications, Inc discussion

* Noted

*Proposal 5: RAN2 to discuss if UE selects additional-ROs first based on some SBFD UE capability indicator.*

*Proposal 6: RAN2 to discuss the maximum number of retries allowed on additional-ROs before triggering fallback to legacy-ROs.*

DISCUSSION

P5

* LG E wonders what is the ue cap indicator? Interdigital think this is not very clear. Charter explains it is implemented in UE.
* Nokia think this is related to whether SBFD UEs always prioritize SBFD ROs.

P6

* LG E think the number is configurable.

*CFRA*

R2-2409625 Consideration on Random Access in SBFD symbols CATT discussion Rel-19 NR\_duplex\_evo-Core

* Noted

*Proposal 8: The RO type should be indicated by NW for CFRA.*

DISCUSSION

* QC think R1 already agreed. ZTE think R1 only agreed for the case of PDCCH-order CFRA.
* Nokia support P8, as this is NW’s control. Ericsson agree.
* Apple not sure about the SI request case.
* LG E think it is just 1 bit indication.
* Sony think this mandate all UEs to use SBFD.
* The RO type is indicated by NW for CFRA. FFS on signaling (can FFS for the SI request case if needed).

*CBRA*

R2-2409745 Impacts on the random access by the evolution of duplex operation Huawei, HiSilicon discussion Rel-19 NR\_duplex\_evo-Core

* Noted

*Proposal 3: No need to have one separate/additional indication from network on UE RACH resource type selection.*

*Proposal 4: Support the SBFD-aware UE to select PRACH resource in non-SBFD symbols when the SSB RSRP smaller than a configured threshold, otherwise to select PRACH resource in SBFD symbols.*

*Proposal 5: If the network doesn't configure the condition, the SBFD-aware UE prioritizes to select the SBFD RACH resource.*

DISCUSSION

P4

* QC do not think RSRQ in P4 is a good metric, and think this prevent the cell edge UEs to use SBFD resources. Nokia agree. QC think if there is no indication then UE just select legacy RO. Interdigital agree.
* LG E has different view than QC since CLI impact will be large. LG E think P4 reasonable. LG E think the proposal work together with QC proposal 6. NEC, Interdigital share this view.

R2-2410609 Random access in SBFD Samsung discussion Rel-19

* Noted

*Proposal 3. Upon initiation of CBRA RACH procedure for a SBFD-aware UE, network can indicate the UE to utilize the nearest RO for low latency.*

R2-2410478 Views on random access for SBFD Qualcomm Incorporated discussion NR\_duplex\_evo-Core

* Noted

*Proposal 6: Upon initiation of RACH procedure for a SBFD-aware UE, if network provides the indication on the prioritization of the legacy ROs and additional ROs, UE selects the type of ROs based on network indication.*

*Proposal 7: Upon initiation of RACH procedure for a SBFD-aware UE, if no additional indication is from network and PRACH transmission with preamble repetitions is not configured in either type of ROs, the initial attempt in the RACH procedure is determined based on the prioritization of the additional-ROs over legacy-ROs. FFS on that case that PRACH transmission with preamble repetitions is configured.*

DISCUSSION

P6 in R2-2410478

Do we need additional indication from NW (nearest RO, legacy or SBFD ROs)

* LG E do not support indication for nearest RO, since it complicates the MAC procedure. Ericsson , ZTE agree. Sharp agree and think it is important to consider interference. LG E open to discuss other indication.
* NEC agree to have indication for legacy or SBFD ROs. ZTE agree and think NW should be able to balance the load in different ROs. Sony agree. Sony, Interdigital agree with P6 in QC paper.
* CATT do not agree with P6 since some UE may see worse channel so not be able to use SBFD even if NW indicates so, and think UE knows better e.g. the RSRP. Nokia agree. Sony has different understanding and think one benefit for using SBFD resource is to improve coverage.
* Nokia wonders if this should for UE-initiated CBRA.

FFS on the following options

**Option 1**

Upon initiation of RACH procedure for a SBFD-aware UE, network provides the indication on the prioritization of the additional ROs over legacy RO.

**If there is no such indication from the NW, FFS on the following mechanism**

* **UE select legacy RO or SBFD RO based on SSB RSRP, or**
* **UE select the legacy RO, or**
* **UE select the SBFD RO, or**
* **Other metrics than SSB RSRP.**

**Option 2**

**UE select legacy RO or SBFD RO based on SSB RSRP if such condition is configured, and if not configured, then UE can prioritize one type of the ROs, FFS which one.**

*Fallback*

R2-2409794 Random Access for SBFD Operation NEC discussion

* Noted

*Proposal-1: the UE should be allowed to switch to additional SBFD RACH occasions after certain (configured) number of times of RACH attempt in legacy RACH occasions, if the UE selects legacy ROs first.*

R2-2409913 Discussion on Random Access in SBFD LG Electronics Inc. discussion Rel-19 NR\_duplex\_evo-Core

* Noted

*Proposal 5. Do not support switching from legacy RACH occasions to SBFD RACH occasions for SBFD-aware UE.*

DISCUSSION

* Nokia, Sharp, QC, Ericsson agree with NEC proposal.
* Samsung support LG E proposal.

Early indication via msg3

R2-2410385 Random access for SBFD Operation Sony discussion Rel-19 NR\_duplex\_evo-Core

* Noted

*Proposal 2: Early identification of SBFD-aware UEs in message 3 is not needed during RA procedure.*

R2-2410088 RA Aspects for SBFD Sharp discussion Rel-19 NR\_duplex\_evo-Core

* Noted

*Proposal 1 Msg3-based early indication in legacy ROs during RA procedure is supported to indicate UE’s SBFD capability.*

DISCUSSION

* Sony do not think this is critical and think we should not spend too much time on this.
* Apple think today we have many features that use msg3 based EI and if we do so here it requires more time to discuss.

RACH configuration

R2-2409974 Detailed design for RACH in SBFD Apple discussion Rel-19 NR\_duplex\_evo-Core

* Noted

*Proposal 3: Only one type of configuration from Option 1 and Option 2 is provided in SIB at the same time.*

*Proposal 4: For Option 1, SBFD specific power control parameters are provided into RACH-ConfigCommon. FFS on SBFD specific SSB-RO mapping configuration.*

*Proposal 5: For Option 2, SBFD specific RACH resources (e.g., rach-SBFD-ConfigCommon) are provided into BWP-UplinkCommon and AdditionalRACH-Config.*

R2-2409995 SBFD RA aspects Ericsson discussion Rel-19 NR\_duplex\_evo-Core

* Noted

*Proposal 1 Only one RACH configuration option (i.e., either RACH configuration Option 1 with Alt 1-1 or RACH configuration Option 2) is supported in a cell.*

*Proposal 2 To aim for a unified RACH design/framework between RACH configuration Option 1 with Alt 1-1 and RACH configuration Option 2.*

*Proposal 3 As in the legacy, for RACH configuration option 2, the additional SBFD RACH configuration is not visible in the MAC spec. In other words, the introduction of selection of RACH configuration should be avoided in the MAC spec.*

DISCUSSION

* ZTE think NW can configured O1 and O2 together in order for all UEs to enjoy this feature. NEC, Charter and Sharp share this view.
* Ericsson think in practice NW will not use these two at the same time.
* CATT think R1 is not ready to do this and if we agree to have both in a cell then we need to inform R1.
* Only one RACH configuration option (i.e., either RACH configuration Option 1 with Alt 1-1 or RACH configuration Option 2) is supported in a cell.

**Agreements on RACH with SBFD**

|  |
| --- |
| CFRA* The RO type is indicated by NW for CFRA. FFS on signaling (can FFS for the SI request case if needed).

CBRA* FFS on the following options

**Option 1**Upon initiation of RACH procedure for a SBFD-aware UE, network provides the indication on the prioritization of the additional ROs over legacy RO.**If there is no such indication from the NW, FFS on the following mechanism*** **UE select legacy RO or SBFD RO based on SSB RSRP, or**
* **UE select the legacy RO, or**
* **UE select the SBFD RO, or**
* **Other metrics than SSB RSRP.**

**Option 2****UE select legacy RO or SBFD RO based on SSB RSRP if such condition is configured, and if not configured, then UE can prioritize one type of the ROs, FFS which one.** RACH configuration* Only one RACH configuration option (i.e., either RACH configuration Option 1 with Alt 1-1 or RACH configuration Option 2) is supported in a cell.
 |

R2-2409571 Discussion on random access procedure in SBFD ZTE Corporation discussion Rel-19 NR\_duplex\_evo-Core

R2-2409579 Discussion on RACH in SBFD Xiaomi discussion Rel-19 Withdrawn

R2-2409584 Discussion on RACH in SBFD Xiaomi discussion Rel-19

R2-2409625 Consideration on Random Access in SBFD symbols CATT discussion Rel-19 NR\_duplex\_evo-Core

R2-2409680 SBFD RACH configuration for initial random access Charter Communications, Inc discussion

R2-2409745 Impacts on the random access by the evolution of duplex operation Huawei, HiSilicon discussion Rel-19 NR\_duplex\_evo-Core

R2-2409794 Random Access for SBFD Operation NEC discussion

R2-2409913 Discussion on Random Access in SBFD LG Electronics Inc. discussion Rel-19 NR\_duplex\_evo-Core

R2-2409974 Detailed design for RACH in SBFD Apple discussion Rel-19 NR\_duplex\_evo-Core

R2-2409995 SBFD RA aspects Ericsson discussion Rel-19 NR\_duplex\_evo-Core

R2-2410088 RA Aspects for SBFD Sharp discussion Rel-19 NR\_duplex\_evo-Core

R2-2410241 Random Access Operation of SBFD Nokia Corporation discussion Rel-19 NR\_duplex\_evo-Core

R2-2410336 Discussion on random access in SBFD CMCC discussion Rel-19 NR\_duplex\_evo-Core

R2-2410385 Random access for SBFD Operation Sony discussion Rel-19 NR\_duplex\_evo-Core

R2-2410478 Views on random access for SBFD Qualcomm Incorporated discussion NR\_duplex\_evo-Core

R2-2410574 Random Access in Sub-Band Full Duplex Google Ireland Limited discussion

R2-2410609 Random access in SBFD Samsung discussion Rel-19

R2-2410791 Discussion on random access procedure in SBFD vivo discussion Rel-19 NR\_duplex\_evo-Core

R2-2410794 Discussion on random access in SBFD Fujitsu Limited 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.

R2-2409638 Other aspects of SBFD Xiaomi discussion Rel-19 NR\_duplex\_evo-Core

* Noted

*Proposal 2: Prioritization of SBFD cells / frequencies during cell reselection is not considered.*

* Prioritization of SBFD cells / frequencies during cell reselection is not considered.

R2-2410258 Other aspects of SBFD Nokia discussion Rel-19 NR\_duplex\_evo-Core

* Noted

*Proposal 4: For inter-cell CSI-RS measurements, UE is provided with information of the SBFD configuration of neighbouring cells.*

DISCUSSION

* Ericsson think this is not only R2 topic but it also impact R4. Ericsson think we need to wait. ZTE, Samsung agree.
* HW support P4. HW think R1 already agree UE need to exclude the SBFD symbols in the CSI-RS measurement. LG E think R1 agreement is for intra cell not inter cell.
* Charter think this might also involve R3.
* RAN2 wait for input from the other WGs regarding whether for inter-cell CSI-RS measurements, UE needs to be provided with information of the SBFD configuration of neighbouring cells.

R2-2409572 Discussion on CLI measurement in SBFD ZTE Corporation discussion Rel-19 NR\_duplex\_evo-Core

* Noted

*UE-to-UE CLI measurement, MR-DC:*

*Proposal 3: RAN2 to support that:*

* In EN-DC and NGEN-DC, only the SN can configure L1 CLI measurements;*

* In NE-DC, only the MN can configure L1 CLI measurements;*

* In NR-DC, both the MN and the SN can configure L1 CLI measurements.*

*Proposal 4: In NR-DC, MN and SN should coordinate the L1 CLI related configuration restriction, in order to not exceed the UE’s capability.*

*gNB-to-gNB CLI measurement*

*Proposal 5: For SBFD gNB-to-gNB CLI measurement, support to include the set of one or more periodic NZP CSI-RS resources configuration into RAN2 INM MeasurementTimingConfiguration.*

**Agreements on other aspects for SBFD**

|  |
| --- |
| * Prioritization of SBFD cells / frequencies during cell reselection is not considered.
* RAN2 wait for input from the other WGs regarding whether for inter-cell CSI-RS measurements, UE needs to be provided with information of the SBFD configuration of neighbouring cells.
 |

R2-2409572 Discussion on CLI measurement in SBFD ZTE Corporation discussion Rel-19 NR\_duplex\_evo-Core

R2-2409626 Discussion on other aspects for SBFD CATT discussion Rel-19 NR\_duplex\_evo-Core

R2-2409638 Other aspects of SBFD Xiaomi discussion Rel-19 NR\_duplex\_evo-Core

R2-2409681 SBFD-aware UE capability indication Charter Communications, Inc discussion

R2-2409746 Other impacts by the evolution of duplex operation Huawei, HiSilicon discussion Rel-19 NR\_duplex\_evo-Core

R2-2409793 Selection of SBFD Cell NEC discussion

R2-2409996 Non-RA aspects for subband full duplex (SBFD) operation Ericsson discussion Rel-19 NR\_duplex\_evo-Core

R2-2410258 Other aspects of SBFD Nokia discussion Rel-19 NR\_duplex\_evo-Core

R2-2410479 Other aspects of SBFD Qualcomm Incorporated discussion NR\_duplex\_evo-Core

R2-2410623 Support of Cross Link Interference in SBFD Samsung discussion Rel-19 NR\_duplex\_evo-Core

R2-2410792 Discussion on other aspects in SBFD vivo 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.

R2-2410325 Work Plan for Rel-19 on NR MIMO Phase 5 CMCC Work Plan Rel-19 NR\_MIMO\_Ph5-Core

* Noted

### 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 for PL offset update

R2-2410326 Discussion on asymmetric DL sTRP and UL mTRP CMCC discussion Rel-19 NR\_MIMO\_Ph5-Core

* Noted

*Proposal 1: PL offset should not be set to ‘delta’ value, which represents the difference in uplink UL RSRP to help UE estimate the path loss between itself and UL-only TRP.*

*Proposal 2: We propose two options to address the dispute 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)*

*Proposal 4: The new MAC CE is proposed to be consisted of the following fields, and the below MAC CE format can be adopted as baseline, with updated with further RAN1 input:*

*- Serving Cell ID: This field indicates the identity of the Serving Cell for which the MAC CE applies. The length of the field is 5 bits;*

*- DL/UL BWP ID: Since the joint TCI state configured in DL BWP and the UL TCI state configured in UL BWP are equally applicable, the DL BWP ID should be indicated for the joint TCI state and the UL BWP ID should be indicated for the UL TCI state.The length of the field is 2 bits;*

*- TCI state IDi: This field indicates the TCI state identified by TCI-StateId as specified in TS 38.331 [5] . The length of the field is 7 bits.*

*- D/U: This field indicate whether the TCI state ID in the same octet is for joint/downlink or uplink TCI state. If this field is set to 1, the TCI state ID in the same octet is for joint/downlink. If this field is set to 0, the TCI state ID in the same octet is for uplink;*

*- R: Reserved bit, set to 0.*

R2-2409640 Consideration on Asymmetric DL sTRP/UL mTRP LG Electronics Inc. discussion Rel-19 NR\_MIMO\_Ph5-Core

* Noted

*Proposal 1: RAN2 introduce PL offset parameter in TCI-State IE and TCI-UL-State IE respectively, where the value range id [-12, 60] dB and the step size is 4dB.*

*Proposal 2. To update PL offset associated with a joint/UL TCI state, RAN2 introduce a new MAC CE with new (e)LCID.*

*Proposal 3. New MAC CE is designed to consider only PL offset update and to not consider TCI state activation.*

*Proposal 4. Absolute value of PL offset is indicated in the new MAC CE.*

*Proposal 5. Up to 8 PL offset are indicated in the new MAC CE.*

*Proposal 6. Only PL offset corresponding to active TCI state is updated by the new MAC CE.*

*Proposal 7. RAN2 design the new MAC CE considering follows.*

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

*- 16-bit codepoint bit map is included*

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

DISCUSSION

P3 in R2-2409640

* Ericsson wonders whether this means TCI state activation is done separately or part of this MAC CE. LG E clarify that they are sperate.
* Nokia agree with the proposal.

P4 in R2-2409640

* Sony clarify that value is the absolute value of PL offset.
* New MAC CE is introduced for PL offset update for asymmetric DL sTRP/UL mTRP. This new MAC CE is identified by new eLCID.
* Absolute value of PL offset is indicated in the new MAC CE. For the offset value, the value range is [-12, 60] dB and the step size is 4dB.

P6 in R2-2409640

* Apple do not think we need this restriction.
* CATT think R1 discussed also SRS and RACH, and think this restriction is not aligned with what R1 discussed.
* Vivo support this proposal and think NW provide this offset value after TCI activation.
* Xiaomi think NW may need to update the offset value even for deactivated TCIs due to UE’s movement. ZTE share this view.
* Nokia agree with the proposal.
* Samsung think some other UL transmission use the RRC configured TCI and do not require TCI activation, so think this new MAC CE should be applied to all configured TCI states.
* LG E think RRC reconfiguration can be used to update the PL offset values for the deactivated TCI states. LG E think we need to check with R1 whether PL offset applies to SRS transmission.
* QC, Apple agree with Samsung that we need to cover all the cases.
* In the MAC CE, PL offset value can be updated for any configured TCI states with RRC configured PL offset, i.e., not limited to the activated TCI states.

**Agreements on asymmetric DL sTRP and UL mTRP**

* New MAC CE is introduced for PL offset update for asymmetric DL sTRP/UL mTRP. This new MAC CE is identified by new eLCID.
* Absolute value of PL offset is indicated in the new MAC CE. For the offset value, the value range is [-12, 60] dB and the step size is 4dB.
* In the MAC CE, PL offset value can be updated for any configured TCI states with RRC configured PL offset, i.e., not limited to the activated TCI states.

PHR triggering

R2-2409661 Discussion on asymmetric DL sTRP and UL mTRP Xiaomi discussion Rel-19 NR\_MIMO\_Ph5-Core

* Not treated

*Proposal 2: The PHR is triggered, when the path loss for the UL-only TRP has changed more than phr-Tx-PowerFactorChange due to:*

* *The RRC configuration of pathloss offset*
* *The MAC CE update of pathloss offset*

R2-2410248 RAN2 Aspects of Asymmetric DL sTRP/UL mTRP Nokia Corporation discussion Rel-19 NR\_MIMO\_Ph5-Core

* Not treated

*Proposal 2: RAN2 to confirm that Path loss offset has no impact on PHR triggering condition*

2TA for single-DCI mTRP

R2-2410388 Enhancement for Asymmetric DL sTRP/UL mTRP Sony discussion Rel-19 NR\_MIMO\_Ph5

* Not treated

*Proposal 5: RAN2 follows/confirms RAN1 agreements to support 2TA for the asymmetric DL sTRP/UL mTRP deployment scenarios.*

R2-2410523 Discussion on Asymmetric DL sTRP/UL mTRP Samsung discussion Rel-19 NR\_MIMO\_Ph5

* Not treated

*Proposal 11: For 2TA in asymmetric DL sTRP/UL mTRP scenario, Rel-17 2TA operation is applied with the following RRC change:*

*• remove the restriction that coresetPoolIndex needs to be configured for the 2TA feature in relevant RRC fields (e.g., tag2);*

*• a single n-TimingAdvanceoffset is configured.*

R2-2409640 Consideration on Asymmetric DL sTRP/UL mTRP LG Electronics Inc. discussion Rel-19 NR\_MIMO\_Ph5-Core

R2-2409661 Discussion on asymmetric DL sTRP and UL mTRP Xiaomi discussion Rel-19 NR\_MIMO\_Ph5-Core

R2-2409721 Discussion on RRC and MAC Impacts for Asymmetric DL sTRP/UL mTRP CATT discussion Rel-19 NR\_MIMO\_Ph5-Core

R2-2409773 Discussion on MAC CE impact for asymmetric DL sTRP/UL mTRP scenarios vivo discussion Rel-19 NR\_MIMO\_Ph5-Core

R2-2409954 RAN2 Impacts for Rel-19 NR MIMO Apple discussion Rel-19 NR\_MIMO\_Ph5-Core

R2-2410248 RAN2 Aspects of Asymmetric DL sTRP/UL mTRP Nokia Corporation discussion Rel-19 NR\_MIMO\_Ph5-Core

R2-2410294 Asymmetric DL/UL mTRP user plane impact from MIMO ph. 5 Ericsson discussion Rel-19 NR\_MIMO\_Ph5-Core

R2-2410326 Discussion on asymmetric DL sTRP and UL mTRP CMCC discussion Rel-19 NR\_MIMO\_Ph5-Core

R2-2410388 Enhancement for Asymmetric DL sTRP/UL mTRP Sony discussion Rel-19 NR\_MIMO\_Ph5

R2-2410429 Discussion on UL only mTRP Qualcomm Incorporated discussion

R2-2410520 Discussion on Asymmetric DL sTRP/UL mTRP Huawei, HiSilicon discussion Rel-19 NR\_MIMO\_Ph5-Core

R2-2410523 Discussion on Asymmetric DL sTRP/UL mTRP Samsung discussion Rel-19 NR\_MIMO\_Ph5

R2-2410770 Consideration on the PL Offset MAC CE for R19 MIMO ZTE Corporation discussion Rel-19 NR\_MIMO\_Ph5-Core

### 8.12.3Others

To identify R2 impact on other objectives

UE-initiated Beam Reporting

*Modelling*

R2-2410430 Discussion on UE initiated beam reporting Qualcomm Incorporated discussion

* Noted

*Proposal 1. RAN2 supports that the event evaluation is handled at MAC layer.*

*Consider an LS to RAN1 if it is agreed to support event evaluation at MAC layer.*

*Proposal 2. RAN2 waits for RAN1’s decision on the first PUCCH design.*

R2-2410355 Discussion on MAC CE impact of Rel-19 MIMO NEC discussion

* Noted

*Proposal 1: It is up to RAN1 to capture the agreement on triggering event determination for Event 2.*

DISCUSSION

* ZTE think it is meaningful to have some conclusion considering the time frame of this WI.
* Samsung think from technical perspective we cannot conclude to have it in MAC, since R1 already agreed to send in PUCCH the step 1 notification, there may not be a need to involve MAC.
* HW think there is no difference in MAC whatever R1 agreed on the step 1 PUCCH notification. Vivo, MediaTek, CMCC, Ericsson, Nokia, InterDigital agree.
* CATT think this case is different from LTM or RLF and prefer to leave it to R1 spec.
* vivo think LTM already agreed to capture the trigger in MAC and it is good to have common way.
* Apple prefer to wait for R1 and think we can progress in the next meeting. LG E agree.
* Xiaomi think it is quite difficult to have common way for LTM and UE initiated BM since the event evaluation is different.

*Others*

R2-2410524 Discussion on UE-initiated Beam Reporting and CSI enhancement Samsung discussion Rel-19 NR\_MIMO\_Ph5

* Not treated

*Proposal 1: Introduce a new IE under CSI-ReportConfig to include the UEI beam reporting configuration.*

R2-2410202 Impacts from other NR MIMO Phase 5 objectives Ericsson discussion

* Not treated

*Proposal 3 enabledCurrentBeamReport-r19 is defined as an optional need R field.*

R2-2409641 Impact from UEI beam reporting LG Electronics Inc. discussion Rel-19 NR\_MIMO\_Ph5-Core

R2-2409660 Discussion on the modelling of the UE-initiated beam report Xiaomi discussion Rel-19 NR\_MIMO\_Ph5-Core

R2-2409774 Discussion on UE-initiated/event-driven beam management vivo discussion Rel-19 NR\_MIMO\_Ph5-Core

R2-2409891 Discussion on UE-initiated/event-driven beam management SHARP Corporation discussion NR\_MIMO\_evo\_DL\_UL-Core

R2-2410202 Impacts from other NR MIMO Phase 5 objectives Ericsson discussion

R2-2410250 RAN2 Aspects of the NR MIMO Nokia Corporation discussion Rel-19 NR\_MIMO\_Ph5-Core

R2-2410327 Discussion on UE-initiated/event-driven beam management CMCC discussion Rel-19 NR\_MIMO\_Ph5-Core

R2-2410355 Discussion on MAC CE impact of Rel-19 MIMO NEC discussion

R2-2410430 Discussion on UE initiated beam reporting Qualcomm Incorporated discussion

R2-2410524 Discussion on UE-initiated Beam Reporting and CSI enhancement Samsung discussion Rel-19 NR\_MIMO\_Ph5

R2-2410618 Enhancements for UE-initiated/event-driven beam management Huawei, HiSilicon discussion Rel-19 NR\_MIMO\_Ph5-Core

R2-2410771 Consideration on the UEIBM for R19 MIMO ZTE Corporation discussion Rel-19 NR\_MIMO\_Ph5-Core

## List of post meeting email discussions

* [POST128][006][ MIMOevo] LS on 8Tx 2TB (Samsung)

 Intended outcome: Approve the LS

 Deadline: short

* [POST128][007][ MIMOevo] LS on differentiation of sDCI mTRP, mDCI mTRP and sTRP (CATT)

 Intended outcome: Approve the LS

 Deadline: short