**3GPP TSG-RAN WG2 Meeting #122 draft - R2-2306551**

**Incheon, Korea, May 22-26, 2023**

**Source: Session Chair (ZTE Corporation)**

**Title: Report from Session on NES, UAV, Rel-15-17 UP, Rel-17 Small Data, IIoT/URLLC, and RACH partitioning**

**Email discussions:**

**[AT122][800] Organizational Eswar – NR\_cov\_enh2 (Rel-18)**

Scope:

* + - Share plans for the meetings and list of ongoing email discussions for the sessions related to Further NR coverage enhancements
		- Share availability of updated session notes and agreements for review and endorsement

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## 7.21 Further NR coverage enhancements

(NR\_cov\_enh2-Core; leading WG: RAN1; REL-18; WID: RP-221858)

Time budget: 0.5 TU

Tdoc Limitation: 2 tdoc

### 7.21.1 Organizational

Incoming LSs, Rapporteur input etc.

Running CRs

Same allocation as Rel-17:

* Stage-2: China Telecom
* RRC: Huawei
* MAC: ZTE

=> Rapporteurs to submit running CRs directly as input to next meeting and we can start reviewing it after that meeting

[R2-2304613](file:///C%3A%5Cevutukuri%5Cwork%5C5G%5CRAN2%5Cdocs%5CR2-2304613.zip) LS on PRACH coverage enhancement (R1-2304141; contact: China Telecom) RAN1 LS in Rel-18 NR\_cov\_enh2 To:RAN2

=> Noted

### 7.21.2 Control plane issues

Details of RACH configuration and RACH partitioning signalling and any other impacts to CP from RAN1 agreements.

**Stage-2 Level discussions:**

- CBRA open issues (SI request support)

Vivo ([R2-2304702](file:///C%3A%5Cevutukuri%5Cwork%5C5G%5CRAN2%5Cdocs%5CR2-2304702.zip))

Proposal 1: MSG1 repetition can be applicable to the 4-step CBRA procedure initiated by Msg1-based SI request.

Proposal 2: MSG1 repetition can be applicable to the 4-step CBRA procedure initiated by Msg3-based SI request.

Samsung ([R2-2304723](file:///C%3A%5Cevutukuri%5Cwork%5C5G%5CRAN2%5Cdocs%5CR2-2304723.zip))

Proposal 3: Msg1 based repetitions are supported for Msg3 based SI request.

Huawei ([R2-2306232](file:///C%3A%5Cevutukuri%5Cwork%5C5G%5CRAN2%5Cdocs%5CR2-2306232.zip))

Proposal 1: MSG3 based SI request is supported with MSG1 repetition.

Proposal 2: MSG1 based SI request with MSG1 repetition is de-prioritised before RAN1 has more progress.

**Joint discussion on the above proposals**

* Samsung and Huawei confirm that MSG3 based can be supported but for MSG1 there may be some additional aspects needed to be considered. Both for RRC and may be for RAN1, so, better we wait.
* Xiaomi thinks MSG1 based CFRA should be discussed togather with CFRA.
* CATT support MSG1 based SI request but we can wait. But it is different to CFRA.

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| Agreements1. MSG1 repetition can be applicable to the 4-step CBRA procedure initiated by Msg3-based SI request
2. FFS for MSG1 repetition can be applicable to the 4-step CBRA procedure initiated by Msg1-based SI request.
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- CFRA support

NEC ([R2-2305269](file:///C%3A%5Cevutukuri%5Cwork%5C5G%5CRAN2%5Cdocs%5CR2-2305269.zip))

Proposal 2: MSG1 repetition can also be applicable to CFRA procedure.

Ericsson ([R2-2305354](file:///C%3A%5Cevutukuri%5Cwork%5C5G%5CRAN2%5Cdocs%5CR2-2305354.zip))

Proposal 1 CFRA is supported for Multiple PRACH Transmissions, at least for BFR and handover.

Vivo ([R2-2304702](file:///C%3A%5Cevutukuri%5Cwork%5C5G%5CRAN2%5Cdocs%5CR2-2304702.zip))

Proposal 4: MSG1 repetition for the CFRA of 4-step type initiated by PDCCH order is deprioritized.

Xiaomi ([R2-2305732](file:///C%3A%5Cevutukuri%5Cwork%5C5G%5CRAN2%5Cdocs%5CR2-2305732.zip))

Proposal 2 Whether to support CFRA for multiple PRACH transmission is left to RAN plenary to decide.

LG ([R2-2306350](file:///C%3A%5Cevutukuri%5Cwork%5C5G%5CRAN2%5Cdocs%5CR2-2306350.zip))

Proposal 3. Wait for RAN1 for support of CFRA with PRACH repetition.

**Joint discussion on the above proposals**

* NEC think for all cases to improve the success rate of RA, we should support for all CFRA cases. Also think spec impact is limited.
* Ericsson think thisis useful at least for BFR and HO
* Vivo explain that for PDCCH order there may be RAN1 impact.
* Xiaomi are not sure if this is in scope of WI
* LG think RO group design and signalling design may impact RAN1 (but we can descuss the benefit here but leave the final decition to RAN1). RACH partitioning is common to all cases. So, either we support all cases or we support none. But we need to inform RAN1.
* CATT think CFRA can be supported for HO, for BFR needs further study
* Huawei think RAN1 are discussing this. Huawei think HO is not critical if the neighbour cell is already in coverage limited situation, we should not HO the UE to such a cell.
* ZTE RAN1 did not support CFRA and no plan to discuss. Only PDCCH order has RAN1 impact. We prioritise HO case (it is in NW control). For BFR and other cases, network doesn’t know where the UE is and may require different solutions for different scenarios. So, prioritise, HO case. Samsung agrees. Nokia agrees. We think we can separte. Ericsson also agree.

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| Agreements1. RAN2 intends to support CFRA for msg1 repetition for ReconfigurationWithSync case, FFS for other cases.
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RSRP thresholds:

ZTE ([R2-2305403](file:///C%3A%5Cevutukuri%5Cwork%5C5G%5CRAN2%5Cdocs%5CR2-2305403.zip))

Proposal 5: RAN2 to agree to configure multiple RSRP thresholds for different repetition numbers. Other triggering conditions can be considered if agreed by RAN1.

Proposal 6: The RSRP threshold(s) for triggering Msg1 repetition are configured per-BWP

Huawei ([R2-2306231](file:///C%3A%5Cevutukuri%5Cwork%5C5G%5CRAN2%5Cdocs%5CR2-2306231.zip))

Proposal 1: Different SSB-RSRP thresholds can be configured corresponding to different PRACH partitions, which are used to differentiate between different Msg1 repetition numbers.

Proposal 2: Multiple SSB-RSRP thresholds for determining Msg1 repetition number are configured per feature, rather than per feature combination. The thresholds can be configured under BWP-UplinkCommon.

CATT ([R2-2304904](file:///C%3A%5Cevutukuri%5Cwork%5C5G%5CRAN2%5Cdocs%5CR2-2304904.zip))

Proposal 5: Define different RSRP thresholds for different MSG1 repetition number

**Joint discussion on the above proposals**

* ZTE think RAN1 already agreed RSRP thresholds. So, we can agree this. And similar to MSG3 repetition.
* Ericsson think there may be something else (e.g. PHR) in addition to RSRP.
* Qualcomm agree with this

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| Agreements1. RAN2 to agree to configure multiple RSRP thresholds for different repetition numbers
2. The RSRP threshold(s) for triggering Msg1 repetition are configured per-BWP
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**Stage-3 discussions (if time allows – after going through UP discussions)**

How to signal the partitions

China Telecom ([R2-2305237](file:///C%3A%5Cevutukuri%5Cwork%5C5G%5CRAN2%5Cdocs%5CR2-2305237.zip))

Proposal 1: Use the spare fields of FeatureCombination to indicate the repetition times {2,4,8} for Msg1.

Proposal 2: Only one spare filed is needed to make choice of repetition times {2,4,8}.

Ericsson ([R2-2305355](file:///C%3A%5Cevutukuri%5Cwork%5C5G%5CRAN2%5Cdocs%5CR2-2305355.zip))

Proposal 1 Parameter msg1-Repetitions-r18 replaces one of spare1-4 in the FeatureCombination information element.

Proposal 2 Add configuration options to FeatureCombinationPreambles IE to indicate the specific repetition factor for a preamble partition that supports msg1 repetitions.

**Joint discussion on the above proposals**

* Ericsson think only one spare bit can be used and include the other features in the extension
* Nokia think this means that all repetitions will be single feature and further discussion may be needed.

R2-2304702 RAN2 Impacts of Multiple PRACH Transmissions from CP vivo Mobile Com. (Chongqing) discussion Rel-18 NR\_cov\_enh2-Core

R2-2304723 Control plane aspects of further NR Coverage Enhancements Samsung Electronics Co., Ltd discussion Rel-18 NR\_cov\_enh2-Core

R2-2304903 Discussion on CP issues for MSG1 repetition CATT discussion Rel-18 NR\_cov\_enh2-Core

R2-2305127 UL Coverage Enhancements Control Plane Qualcomm Incorporated discussion Rel-18

R2-2305237 RACH partition framework of Coverage Enhancement China Telecom discussion Rel-18 NR\_cov\_enh2-Core

R2-2305355 Discussion on Multiple PRACH Transmission Configuration Ericsson discussion Rel-18 NR\_cov\_enh2-Core

R2-2305403 CP issues for PRACH coverage enhancement ZTE Corporation, Sanechips discussion Rel-18 NR\_cov\_enh2-Core

R2-2305732 Discussion on RAN2 impact of PRACH enhancement Xiaomi discussion Rel-18

R2-2305929 Multiple PRACH transmissions – CP aspects InterDigital discussion Rel-18 NR\_cov\_enh2-Core

R2-2306231 RRC aspects for Msg1 repetition Huawei, HiSilicon discussion Rel-18 NR\_cov\_enh2-Core

R2-2306349 Signalling aspects on support of PRACH repetition LG Electronics Inc. discussion Rel-18 NR\_cov\_enh2-Core

### 7.21.3 User plane issues

Overall RACH procedure and any other MAC impacts

**Stage-2 issues**

Which fallbacks do we support/rule-out?

ZTE ([R2-2305404](file:///C%3A%5Cevutukuri%5Cwork%5C5G%5CRAN2%5Cdocs%5CR2-2305404.zip))

Proposal 6: RAN2 to confirm not to support any fallback case related to Msg1 repetition.

Nokia ([R2-2305754](file:///C%3A%5Cevutukuri%5Cwork%5C5G%5CRAN2%5Cdocs%5CR2-2305754.zip))

Proposal 2: Do not support fallback from 2-step RA to 4-step RA with Msg1 repetition.

Proposal 3: Define different number of Msg1 repetitions as single feature in RRC and NW may associate one or multiple number(s) of repetitions for a given RACH partition.

Proposal 4: Support fallback from lower number of Msg1 repetitions to higher number of Msg1 repetitions.

Qualcomm ([R2-2305128](file:///C%3A%5Cevutukuri%5Cwork%5C5G%5CRAN2%5Cdocs%5CR2-2305128.zip))

Proposal 1: Fallback from Msg1 repetition with lower number to Msg1 repetition with higher number is supported.

Proposal 2: RAN2 will deprioritise:

• Fallback from 2-step RA to 4-step RA with Msg1 repetition;

• Fallback from CFRA to CBRA with Msg1 repetition.

Interdigital ([R2-2305930](file:///C%3A%5Cevutukuri%5Cwork%5C5G%5CRAN2%5Cdocs%5CR2-2305930.zip))

Proposal 1: The UE can increase the number of multiple PRACH transmissions after a configured number of retransmissions without receiving RAR.

Joint discussion on the above proposals

* ZTE think the impact to MAC is severe. If we allow one fallback we may as well support all fallbacks. Samsung agree. LG agree.
* Nokia think from lower number to higher number is useful. Modelling in MAC will be simplified if we model this as single feature but the imapct to RRC is TBD. We should discuss whether to support this or not. Nokia explain that after repetitions, we don’t have any power to increase the only option is to increase the repetitions, so, this may be useful
* QC want to support it for lower number to higher. But, there will be reset of variables.
* Interdigital also want to support for lower number to higher. CATT agree.
* Huawei think it may be doable if there is no reselection between features.

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| Agreements1. RAN2 to further discusss fallback from lower number of MSG1 repetition to higher number which is also FFS for now. We need to understand how to signal this and how this impacts MAC procedure.
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R2-2304703 RAN2 Impacts of Multiple PRACH Transmissions from UP vivo Mobile Com. (Chongqing) discussion Rel-18 NR\_cov\_enh2-Core

R2-2304724 User plane aspects of further NR Coverage Enhancements Samsung Electronics Co., Ltd discussion Rel-18 NR\_cov\_enh2-Core

R2-2304904 Discussion on UP issues for MSG1 repetition CATT discussion Rel-18 NR\_cov\_enh2-Core

R2-2305128 UL Coverage Enhancements User Plane Qualcomm Incorporated discussion Rel-18

R2-2305269 UP Impacts for Further NR Coverage Enhancements NEC Corporation discussion NR\_cov\_enh2-Core

R2-2305354 Discussion on Multiple PRACH Transmission Procedures Ericsson discussion Rel-18 NR\_cov\_enh2-Core

R2-2305404 UP issues for PRACH coverage enhancement ZTE Corporation, Sanechips discussion Rel-18 NR\_cov\_enh2-Core

R2-2305753 UP impacts of PRACH CE Nokia, Nokia Shanghai Bell discussion Rel-18 NR\_cov\_enh2-Core

R2-2305754 Fallback cases for PRACH repetition Nokia, Nokia Shanghai Bell discussion Rel-18 NR\_cov\_enh2-Core

R2-2305930 Multiple PRACH transmissions – UP aspects InterDigital discussion Rel-18 NR\_cov\_enh2-Core

R2-2306232 Discussion on MAC aspect with MSG1 repetition Huawei, HiSilicon discussion Rel-18 NR\_cov\_enh2-Core

R2-2306350 RA procedure to support PRACH repetition LG Electronics Inc. discussion Rel-18 NR\_cov\_enh2-Core