3GPP TSG-RAN WG2 #109 electronic Tdoc R2-2001917

Elbonia, USA, 18th – 22nd November 2019

Agenda Item: 6.13.1

Source: Ericsson

Title: Summary of CP open issues

Document for: Discussion, Decision

# 1 Introduction

This document treats the e-mail discussion:

* [AT109e][508][2-step RA] CP open issues (Ericsson)

Scope:

* + - Identify/Summarize all remaining open issues related to CP open issues f4rom AI 6.13.3 and related CP issues in 6.13.4 and seek companies feedback on the need to solve the critical issue and preferred solutions.

Intended outcome:

* + - Set of proposals with full consensus (aim to agree to those over email)
    - Set of proposals with almost full consensus and easy to agree
    - Set of open issues and proposals to postpone to next meeting.
    - Open issues that should no longer be pursued

Deadline for providing comments:

* + - Companies input: Thursday, Feb. 27th 18:00 CET
    - Rapporteur proposals: Friday, Feb. 28th 18:00 CET (one day for rapporteur to make conclusions)
    - Comments on proposals’ wording, Tuesday, March 3rd by 08:00 CET

This summary will not deal with issues that are discussed as part of the on-going e-mail discussions, which currently are the RRC running CR [2] and MAC running CR [3] e-mail discussion.

The topic of this summary is concentrated on issues related to control plane part of 2-step random access, while the discussion in [4] deals with user plane issues.

Where the proposal contains a set of options, we ask companies to input their preference or changes to the options. At submission, the proposals should not contain any options. This means that a proposal that currently looks like this:

***Proposal 1 On issue X:***

***Option 1:*** *Use Y method.*

***Option 2:*** *Use Z method*

Should be made into the following by the end of e-mail discussion:

***Proposal 2 On issue X, the method Z is used.***

# 2 Discussion

## 2.1 UE capabilities

For this meeting only one contribution deals with capabilities:

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| **Contribution** | **Summary** |
| R2-2001095 (Intel) | Discusses RAN2-specific capability and more specifically 2-step CFRA and whether support of 2-step CBRA implies 2-step CFRA support.  Proposals are: 1) Same capability for 2-step CBRA and CFRA is introduced and 2) If separate capabilities is introduced for 2-step CFRA, RAN2 to discuss whether 2-step CFRA is per-band or per-UE. 3) No separate capability is introduced for csi-rs based 2-step RA. |

Based on the fact that no other company has mentioned this in any contribution, no conclusion can be made at this point in time based on company input.

To progress on RAN2 capabilities we believe that the following could be pursued:

**1)** Start e-mail discussion on RAN2-specific capabilities for next meeting,

**2)** Wait for RAN1 feature list,

**3)** Conclude on UE features and capabilities for 2-step RA.

1. RAN2 to start detailing RAN2-specific capabilities(if any).

For the RAN2-specific parts, i.e 1) above, then a first proposal could be the following:

1. 2-step CBRA support implies 2-step CFRA support, thus no capabilities for 2-step CFRA support shall be introduced.

Whether the capabilities are band-limited or not, we propose that this is FFS up to RAN1:

1. On whether capabilities are band-limited, RAN2-capabilities can follow that of RAN1.

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| **Company** | **Comments on proposals** |
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## 2.2 CFRA preamble-to-PRU mapping

In the e-mail discussion on the running RRC CR[1], the issue of CFRA resource signalling was discussed, in particular whether the resources for 2-step RA shall be shared between 2-step CFRA and 2-step CBRA. As this is still FFS, we will not address it here, but rather go more into detail on the signalling on how a preamble should map to a PRU (PUSCH Resource Unit) for 2-step CFRA.

The following contributions deal on the details of CFRA signalling:

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| **Contribution** | **Summary** |
| R2-2000224 (Samsung) | Discusses PUSCH resource configurations and how the mapping between CFRA RO and preamble should identify a msgA PUSCH resource.  The proposals are that:  - PUSCH occasion index in the signaled PUSCH configuration is signaled along with the preamble indices.  - The PUSCH occasions are indexed in order by  - Increasing order of frequency resource index for freq. multiplexed PUSCH resources,  - Increasing order of time resources, for time-multiplexed resources,  - Increasing order of indices for PUSCH slots corresponding to a PRACH slot. |
| R2-2000410 (Oppo) | Proposes that the parameters for CFRA PUSCH configurations are configured independently of CBRA msgA PUSCH resources. |
| R2-2000650 (CATT) | Proposes that the full *MsgA-PUSCH-Resource-r16* is used to configure CFRA resources for 2-step RACH and that no further optimization is required in this release and that no LS to RAN1 is needed. |
| R2-2000778 (Fujitsu) | Discusses RO and PO configurations for CFRA and number of options for sharing of RO and PO between 4-step CBRA, 2-step CBRA and 2-step CFRA.  Proposes the following:  For ROs  - Sharing of ROs between 4-step and 2-step CFRA should be supported and that the parameter *msgA-TotalNumberOfRA-Preambles* should be used for this.  - Three different options for ROs are suggested:  - ROs sharing with 4-step RA  - ROs sharing with 2-step CBRA,  - Separate ROs  For msgA PUSCH:  - The Information element *MsgA-PUSCH-Config* shall be reused for 2-step CFRA.  - The PUSCH configuration for ROs sharing with 4-step RA and/or 2-step CBRA should be included in SIB1 while for separate ROs, this can be signalled dedicately.  For preamble-to-PRU mapping for CFRA:  - Reuse the mapping rule between PRACH and msgA PUSCH as for CBRA for CFRA  - For shared ROs between 2-step CBRA and CFRA, the PUSCH configuration associated to the shared ROs can be shared between 2-step CBRA and 2-step CFRA.  - Fallback to 4-step RA should be supported by CFRA and if fallback to 4-step RA is not supported by CFRA, then dedicated PRU should be used for CFRA. |
| R2-2000998 (ZTE) | Discusses resource configurations for 2-step CFRA.  Proposes:  - Separate RACH configurations for 2-step CFRA should be allowed and if not configured then the configuration for 2-step CBRA will be reused.  - The method for the configuration of contention-free preambles for each SSB/CSI-RS in 4-step CBRA can be resued for 2-step CFRA.  - The IEs used to to signal the configuration for MsgA PUSCH shall be reused.  - For determining the PRU based on the preambles reserved for SSB/CSI-RS:  - It is proposed to use the mapping rule for 4-step CBRA along with an offset and signaling the number of preambles used for contention-free 2-step RA. |

Based on the submitted contributions there seem to be two suggested methods for signalling the PRU:

1) Reusing the preamble-to-PRU mapping rule defined by RAN1 along with the number of preambles and an offset for the start of the preambles in each SSB/CSI-RS.

2) Signaling the index of the PUSCH occasion index in each SSB/CSI-RS.

Given that agreements are made on CFRA options in [2], we propose the following for signalling the PRU in CFRA:

1. On signalling the PRU for CFRA:

**Option 1:** Reuse the preamble-to-PRU mapping rule defined by RAN1 along with the number of preambles and an offset for the start of the preambles in each SSB/CSI-RS.

**Option 2:** Signal the index of the dedicated PUSCH occasion in each SSB/CSI-RS.

**Option 3:** FFS awaiting the outcome of the discussion in [3].

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| **Company** | **Comments on proposals** |
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## 2.2 RRC configuration

The following contributions deal with details on RRC configurations that are not discussed as part of the running RRC discussion:

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| **Contribution** | **Summary** |
| R2-2000586 (Apple) | For 2-step only BWP, if a fallback RAR is sent, the UE needs to apply parameters associated with 4-step random access. The proposal is to include the parameters *msg3-DeltaPreamble* and *ra-ContentionResolutionTimer* in the 2-step only BWP case. |

At first it can be beneficial to agree whether fallback RAR should be supported for 2-step only BWP.

1. Fallback RAR shall be supported for 2-step only BWP.

If fallback RAR is supported for 2-step only BWP:

1. Include *msg3-DeltaPreamble* and *ra-ContentionResolutionTimer* in the 2-step only BWP configuration.

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| **Company** | **Comments on proposals** |
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## 2.3 Release of CFRA resources

For the contributions dealing with the release of CFRA resource

In RAN2#108 we had the following agreement:

**Agreements for HO 2-step RA:**

9 The PUSCH resource for 2-step CFRA associated with the dedicated preamble will be configured to the UE via dedicated signalling (i.e. will not be included in SIB1). FFS how and when the PUSCH resources is releases

The contributions dealing with this and the proposals:

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| **Contribution** | **Summary** |
| R2-2000916 (CMCC) | Proposals:  - Introduce a new signaling to inform to release the PUSCH resources in a subesequent message to *RRCReconfigurationComplete*, or to carry a PUSCH resource release indication in msgB.  - Release the corresponding PUSCH resources once it indicates failure to the upper layer. |
| R2-2001514 (LG)  (+ CRs in 1515 and 1518) | Proposals:  - UE should release CFRA resources for 2-step RA for the same conditions as in rel-15:  - i.e completion of random access procedure,  - MAC reset is requested by upper layers and,  - when T304 of MCG expires.  Further in R2-2001515 and R2-2001518 there are MAC and RRC TPs for using the same behaviour as in rel-15. |

Based on the above contributions, we propose the following:

1. On discarding/releasing the 2-step CFRA resources, agree and select between the options:

**Option 1:** Use same behaviour as for rel-15 for releasing 2-step CFRA.

**Option 2:** Introduce a new message for releasing the PUSCH resources or carry a PUSCH resource release indication in msgB.

1. If same behaviour as in rel-15 is used, i.e option 1 above, then principally agree to the TPs in R2-2001515 and R2-2001518.

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| **Company** | **Comments on proposals** |
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## 2.4 Others

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| **Contribution** | **Summary** |
| R2-2000392 (Ericsson) | Beam specific 2-step RA support.  The proposals are that the RRC specification should support SSB-beam specific 2-step RA. And the contribution also contains a TP on how this can be supported. |
| R2-2000956 (Huawei) | Prioritized 2-step RACH.  The contribution considers further parameters to be used in the prioritized 2-step RA. The parameters are *msgA-rsrp-Threshold* and *msgA-TransMax* and these could be given a different value for prioritized random access in order to reduce the latency. |

As these contributions are addressing issues on CP that no other company is mentioning, we propose to either postpone these or discuss them in an e-mail discussion on remaining CP issues for 2-step RA.

1. RAN2 to further discuss remaining CP issues for 2-step RA.

**Option 1:** Postpone them

**Option 2:** Discuss in e-mail discussion

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| **Company** | **Comments on proposals** |
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# 3 Conclusion

The proposals below have the following color-coding(will be applied later):

**Easy agreement.**

**Might require discussions/clarifications.**

**Will most likely generate discussions.**

**Candidate for postponing.**

Based on the discussion in the previous sections we propose the following:

# 4 References

1. R2-2001217, 2-step RA 38.331 Running draft CR, Ericsson, RAN2#109e, March 2020, Elbonia (online meeting)
2. R2-2001218, RRC open issues, Ericsson, RAN2#109e, March 2020, Elbonia (online meeting)
3. R2-2000997, Running CR on 38.321 for 2-step RA, ZTE, RAN2#109e, March 2020, Elbonia (online meeting)
4. R2-2001916, Summary of UP open issues, ZTE, RAN2#109e, March 2020, Elbonia (online meeting)