**3GPP TSG-RAN WG4 Meeting #94-e R4-2002322**

**Electronic Meeting, Feb.24th – Mar.6th 2020**

**Agenda item:** 8.20.2

**Source:** Moderator (ZTE)

**Title:** Email discussion summary for RAN4#94e\_#68\_NR\_2step\_RACH\_RRM

**Document for:** Information

# Introduction

The scope of this email discussion summary covers agenda 8.20.2 for RRM requirements of 2-step RACH. Following open issues are to be discussed.

* Whether to add RRM requirements into the objective of the 2-step RACH WID
* Impact to random access requirements
* What RRM requirements to be specified for 2-step RACH
* How to specify 2-step RACH RRM requirements
* Impact to RRM requirements other than random access requirements due to 2-step RACH
* Work plan for 2-step RACH RRM requirements

The candidate target of this email discussion for 1st round is to collect comments from companies on the topic. If 2nd round is needed depending on outcome of 1st round.

# Topic #1: 2-step RACH RRM requirements

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| [R4-2001279](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001279.zip) | ZTE | Proposal 1: RRM requirements for 2-step RACH is necessary to be specified.  Proposal 2: FFS how to specify RRM requirements for 2-step RACH.  Proposal 3: RRM requirements are specified for both contention-based and contention-free 2-step RACH procedures.  Proposal 4: RRM requirements for 2-step RACH fallback procedure are specified.  Proposal 5: FFS if there is any impact to RRM requirements other than random access requirements due to 2-step RACH.  Proposal 6: Test cases for 2-step RACH is introduced.  Proposal 7: Suggest to add RRM requirements, including core requirements and test cases, into the objective of the WID [1] in the next RAN plenary meeting. |
| [R4-2001492](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001492.zip) | Nokia, Nokia Shanghai Bell | Observation 1: Major differences exist in between the 4-step and the 2-step RACH procedures that should be included as RRM requirements. These include the UE behaviour when transmitting MsgA, which includes a PUSCH, and the behaviour after receiving a MsgB. The MsgB may contain successRAR, fallbackRAR, and backoff indicator. An overview of the differences are shown in Table 1.  Proposal 1: RAN4 to discuss the introduction of the 2 step RACH procedure, considering the observations in this document and summary in Table 1.  Observation 2: As for 2-step RACH there are no expected timing changes for the first available PRACH occasion, timing requirements depending on the uncertainty in acquiring the first available PRACH occasion do not need to be updated.  Proposal 2: No change on requirements that depend on the timing of the first available PRACH occasion due to the 2-step RACH procedure.  Observation 3: Based on the proposals above, we believe the text of 38.133 should be updated to include 2-step RACH behaviour. This can be achieved in either one of the options bellow:   * Option 1: New exclusive clause for 2-step RACH. * Option 2: Insert 2-step RACH requirements within existing 4-step RACH requirements.   Proposal 3: Create new clause 6.2.2.3 to TS 38.133, which describes the 2-step RACH requirements. Keep clause 6.2.2.2 in TS 38.133 only with 4-step RACH requirements.  Proposal 4: Suggest inclusion of RRM requirements into the objectives of the 2-step RACH WID. |
| [R4-2002129](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2002129.zip) | Qualcomm | Observation 1: In 2 step RACH, UE transmits PRACH and PUSCH to gNB before receiving any random-access response from gNB.  Observation 2: RAN4 has defined core and performance requirements for a set of procedures. RACH impacts the following subset among those procedures:   1. Handover    1. NR handover 2. RRC connection mobility control    1. RRC re-establishment    2. Random access    3. RRC connection release with redirection   Observation 3: If 2-step RACH feature is enabled, UE can be configured to perform the procedures mentioned in observation 2 while transmitting PRACH and PUSCH before receiving random access response.  Proposal: 3GPP defines RRM core and performance requirements for 2 step RACH during the following procedures:   1. Handover    1. NR handover 2. RRC connection mobility control    1. RRC re-establishment    2. Random access    3. RRC connection release with redirection   Note: We will propose to update the WID during the next RAN plenary so that it incorporates above proposal. |
| [R4-2000802](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2002129.zip) | ZTE | 2.2 Work plan for RRM core and performance requirements  RAN4#94-e:   1. Initial discussion on RRM core requirements for 2-step RACH   RAN4#94bis:   1. Continue discussion on RRM core requirements for 2-step RACH 2. Draft CR for 2-step RACH RRM core requirements;   RAN4#95:   1. Agree CR for 2-step RACH RRM core requirements; 2. Discussion and draft CR on 2-step RACH RRM performance requirements;   RAN4#96:   1. Agree CR for 2-step RACH RRM performance requirements;   Note: For 2-step RACH RRM requirements, the work plan will be revised depending on decisions in RANP#87 meeting. |

## Open issues summary

### RRM requirements due to 2-step RACH

Issue 1-1-1: Whether to add RRM requirements into the objective of the 2-step RACH WID

* Proposals
  + Option 1 (ZTE, Qualcomm, Nokia)
    - Suggest to add RRM requirements, including core requirements and test cases, into the objective of the 2-step RACH WID in the next RAN plenary meeting.
* Recommended WF:
  + Suggest to add RRM core requirements and performance requirements (test cases) into the objective of the 2-step RACH WID in the next RAN plenary meeting.

Issue 1-1-2: Impact to random access requirements

* Proposals
  + Option 1 (ZTE, Qualcomm, Nokia)
    - Define RRM core and performance requirements for 2 step RACH procedure.
* Recommended WF:
  + Define RRM core and performance requirements for 2 step RACH procedure.

Issue 1-1-3: What RRM requirements to be specified for 2-step RACH

* Proposals
  + Option 1 (ZTE)
    - RRM requirements are specified for both contention-based and contention-free 2-step RACH procedures.
    - RRM requirements for 2-step RACH fallback procedure are specified.
* Recommended WF:
  + RRM requirements are specified for both contention-based and contention-free 2-step RACH procedures.
  + RRM requirements are specified for 2-step RACH fallback procedure.

Issue 1-1-4: How to specify 2-step RACH RRM requirements

* Proposals
  + Option 1 (ZTE)
    - FFS how to specify RRM requirements for 2-step RACH.
  + Option 2 (Nokia)
    - Create new clause 6.2.2.3 to TS 38.133, which describes the 2-step RACH requirements. Keep clause 6.2.2.2 in TS 38.133 only with 4-step RACH requirements.
* Recommended WF:
  + FFS how to specify RRM requirements for 2-step RACH
    - Option 1: Insert 2-step RACH requirements within existing 4-step RACH requirements.
    - Option 2: New exclusive clause for 2-step RACH.

Issue 1-1-5: Impact to RRM requirements other than random access requirements due to 2-step RACH

* Proposals
  + Option 1 (ZTE)
    - FFS if there is any impact to RRM requirements other than random access requirements due to 2-step RACH.
  + Option 2 (Nokia)
    - No change on requirements that depend on the timing of the first available PRACH occasion due to the 2-step RACH procedure.
  + Option 3 (Qualcomm)
    - 3GPP defines RRM core and performance requirements for 2 step RACH during the following procedures:
      * NR handover
      * RRC re-establishment
      * RRC connection release with redirection
* Recommended WF:
  + FFS impact to following requirements due to introduction of 2-step RACH
    - NR handover
    - RRC re-establishment
    - RRC connection release with redirection

Issue 1-1-6: Work plan for RRM requirements for 2-step RACH

* Proposals
  + Agree the work plan for RRM requirements for 2-step RACH in R4-2000802
* Recommended WF:
  + Agree the work plan for RRM requirements in R4-2000802

## Companies views’ collection for 1st round

### Open issues

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| **Company** | **Comments** |
| Nokia, Nokia Shanghai Bell | 1-1-1: Option 1, we agree to add RRM requirements into the 2-step RACH WID objectives.  1-1-2: Option 1, we agree with defining RRM core and performance requirements.  1-1-3: Option 2, we believe the proposal is incomplete, and can be improved with the following text:  RRM requirements are specified for both contention-based and contention-free 2-step RACH procedures.  *RRM requirements for the UE behaviour after receiving MsgB, including SuccessRAR, FallbackRAR, and Backoff Indicator.*  1-1-4: Option 2, in our opinion the 2-step RACH procedure has enough differences that justifies an exclusive clause.  1-1-5: Option 1, we agree with studying impact on handover, RRC re-establishment, and RRC connection release with redirection due to 2-step RACH procedure.  1-1-6: we agree with the work plan for RRM requirements in R4-2000802. |
| Qualcomm | 1-1-1: Option 1. Agree with the recommended WF.  1-1-2: Option 1. Agree with the recommended WF.  1-1-3: Agree with defining RRM requirements for both contention based and contention free 2 step RACH procedure.  We propose that it is **FFS** whether RRM requirements are specified for 2 step RACH fall procedure.  1-1-4: Agree with the recommended WF. It is FFS how to specify RRM requirements for 2 step RACH.  1-1-5: We prefer option 3 but we will be OK with the recommended WF, i.e., the impact of 2 step RACH on these three requirements can be FFS at this point. |
| Ericsson | Sub topic 1-1-1: We agree to revise WID so that RRM and performance requirements are included in the 2-step RACH objectives.  Sub topic 1-1-2: We agree to define RRM core and performance requirements for 2-step RACH.  Sub topic 1-1-3/1-1-4/1-1-5: RAN4 should discuss them after RAN plenary approves the revision of WID. Since there is no objective in the latest WID, some companies are not ready to discuss the detailed impact for RRM core requirement with the 2-step RACH procedure. |
| ZTE | Issue 1-1-3: Technically we agree with Nokia’s comments on the improvement of the recommended WF. We are also fine to FFS. At this stage it would be better to focus on identifying technical issues.  Issue 1-1-4: We think option 2 could be one good approach. We are fine to have separated clause for 2-step RACH. Also as above, it would be better to be FFS at this phase. |
| Huawei, HiSilicon | We have similar view as Ericsson. As the work in other WGs are also ongoing, we suggest to keep Issue 1-1-3/4/5/6 FFS and discuss the details in next meeting. |

## Summary for 1st round

### Open issues

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|  | **Status summary** |
| **Work plan for 2-step RACH RRM requirements** | *Tentative agreements:*   * The work plan for 2-step RACH RRM requirements in R4-2000802 is agreeable.   *Recommendations for 2nd round:*   * Confirm if tentative agreements above are agreeable |
| **RRM requirements for 2-step RACH** | *Tentative agreements:*   * Suggest to add RRM requirements, including core requirements and performance requirements, into the objective of the 2-step RACH WID in the next RAN plenary meeting. * Define RRM core and performance requirements for 2 step RACH procedure.   *Recommendations for 2nd round:*   * The tentative agreements are agreeable. No further action   *Tentative agreements:*   * FFS RRM requirements to be specified for 2-step RACH during the following procedures   + Contention-based 2-step RACH and contention-free 2-step RACH procedures     - FFS RRM requirements for the UE behaviour, e.g. after receiving MsgB, SuccessRAR, FallbackRAR, and Backoff Indicator etc. * FFS how to specify RRM requirements for 2-step RACH procedures   + Option 1: New exclusive clause for 2-step RACH.     - Create new clause 6.2.2.3 to TS 38.133, which describes the 2-step RACH requirements. Keep clause 6.2.2.2 in TS 38.133 only with 4-step RACH requirements.     - Other options can also be considered.   + Option 2: Insert 2-step RACH requirements within existing 4-step RACH requirements. * FFS impact to the following RRM requirements due to introduction of 2-step RACH procedure.   + NR handover   + RRC re-establishment   + RRC connection release with redirection   + Others if identified.   Note: RAN4 will continue to discuss the above issues after RAN plenary approves the revised WID.  *Recommendations for 2nd round:*   * Confirm if tentative agreements above are agreeable. |

*Recommendations on WF/LS assignment*

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|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 | WF on 2-step RACH RRM requirements | ZTE |

## Discussion on 2nd round

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| **Company** | **Comments** |
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## Summary on 2nd round

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| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
| R4-2002259 | *agreeable* |