**3GPP TSG-RAN WG4 Meeting #96-e R4-**

**Electronic Meeting, 17 August – 28 August, 2020**

**Agenda item:** 7.18.1, 7.18.2

**Source:** Moderator (ZTE Corporation)

**Title:** Email discussion summary for [96e][227] NR\_2step\_RACH\_RRM

**Document for:** Information

# Introduction

The scope of this email discussion summary covers following agenda items.

* 7.18.1 RRM core requirements maintenance (38.133)
* 7.18.2 RRM perf. requirements (38.133)
  + 7.18.2.1 General
  + 7.18.2.2 Test cases

# Topic #1: Core requirements maintenance

## Companies’ contributions summary

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| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2009686 | ZTE Corporation | Maintenance CR for 2-step RA |

## Open issues summary

### Sub-topic 1-1

Issue 1-1: Correct in core requirements “PRACH transmission power” or “MsgA transmission power” to “MsgA PRACH transmission power”

* Proposals
  + Option 1: Correct the above descriptions (ZTE)
* Recommended WF
  + Support Option 1

## Companies views’ collection for 1st round

### Open issues

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| **Company** | **Comments** |
| XXX | Sub topic 1-1: |

### CRs/TPs comments collection

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| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2009686 | Company A |
| Company B |
|  |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

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| --- | --- |
|  | **Status summary** |
| **Sub-topic#1-1** | *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:* |

*Recommendations on WF/LS assignment*

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| --- | --- | --- |
|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 |  |  |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provides recommendation on CRs/TPs Status update*

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| **CR/TP number** | **CRs/TPs Status update recommendation** |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

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| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
| XXX | *Based on 2nd round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

# Topic #2: Test cases for 2-step RA

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2009683 | ZTE Corporation | **Proposal 1: Don’t define test cases for handover, RRC re-establishment, RRC connection with redirection and PSCell addition.**  **Proposal 2: Discuss the test cases for 2-step random access using the prepared draft CR and capture agreements in it.**  **Proposal 3: Discuss and finalize the above work split:**   |  |  | | --- | --- | | A.3.8 PRACH configurations | Company A | | A.4.3.2.2 Random Access | Company B | | A.5.3.2.2 Random Access | Company C | | A.6.3.2.2 Random Access | ZTE | | A.7.3.2.2 Random Access | Company E | |
| R4-2009979 | Qualcomm Incorporated | Observation 1: Rel-15 defined performance tests for both CBRA and CFRA of 4-step RACH.  Observation 2: Rel-16 extended the initial UL TX timing accuracy requirement to both msgA-PRACH and msgA-PUSCH of 2-step RACH.  Observation 3: A UE, that can transmit Msg1 with 4-step RACH configuration should also be able to transmit MsgA-PRACH with 2-step RACH configuration if the UE is capable of 2-step RACH.  Observation 4: Rel-15 did not define any performance tests for 4-step RACH in SUL.  **Proposal 1: Rel-16 defines performance tests for both CBRA and CFRA of 2-step RACH.**   * **Note: Performance tests should check the accuracy of transmit timing of both msgA-PRACH and msgA-PUSCH.**   **Proposal 2: RAN4 uses the 4-step CBRA and CFRA test cases that got defined in Rel-15 as a starting framework to define the 2-step CBRA and CFRA test cases.**   * **The test cases of 2-step RACH should use AWGN propagation condition, setup 2b for AoA and rough UE beams.** * **Performance tests should check UE’s performance regarding fallbackRAR and successRAR.**   **Proposal 3: RAN4 does not define performance tests for procedures of handover, RRC re-establishment, RRC connection with redirection and PSCell addition with 2-step RACH.**  **Proposal 4: Rel-16 does not define performance tests for 2-step RACH in SUL.** |
| R4-2010468 | Ericsson | **Proposal 1: No impact for test cases in TS36.133 due to 2-step RACH.**  **Proposal 2: Define the test cases for random access procedure for 2-step RA type in:**   * **A.4.3.2.2A (EN-DC FR1)** * **A.5.3.2.2A (EN-DC FR2)** * **A.6.3.2.2A (SA FR1)** * **A.7.3.2.2A (SA FR2)**   **Proposal 3: The handover test cases below apply to 2-step RACH:**   * **A.6.3.1 (SA FR1)** * **A.7.3.1 (SA FR2)**   **Proposal 4: Not define test cases of UL transmit timing, PScell addition delay, PSCell change, and conditional PSCell change due to 2-step RACH.**  **Proposal 5: For handover test for 2 step-RACH, add new parameter tables for 2-step RACH.**  **Proposal 6: Introduce 2-step RACH MsgA configuration in RMC.** |
| R4-2010908 | Nokia, Nokia Shanghai Bell | [**Observation 1:** Existing RRM tests for 4-step RA type are defined in FR1 for PSCell in EN-DC, in FR2 for PSCell/SCell in EN-DC, and in FR1 and FR2 for NR standalone.](#_Toc47706982)  [**Proposal 1: RAN4 to define RRM tests for 2-step RA type in FR1 and FR2, and for EN-DC and NR standalone.**](#_Toc47706983)  [**Observation 2:** The CBRA tests for 4-step RA type follow a structure that tests for PRACH transmission and RAR reception which differs from the 2-step RA type.](#_Toc47706984)  [**Proposal 2: RAN4 to specify RRM test cases for the MsgA transmission and MsgB containing successRAR and fallbackRAR 2-step RA type.**](#_Toc47706985)  [**Observation 3:** CSI-RS-based RACH is specified in existing 4-step RA type RRM tests, however current RRM requirements for 2-step RA type in clause 6.2.2.3.2 do not include CSI-RS.](#_Toc47706986)  [**Observation 4:** The existing RRM test clauses in 38.133 matches the signalling flow of the 4-step RA type and reusing current structure for 2-step RA would result in unclear requirements.](#_Toc47706987)  [**Proposal 3: Define contention-based and contention free 2-step RA type tests with the clause structure presented in Table 4.**](#_Toc47706988)  [**Proposal 4: RAN4 to distribute the tests of fallbackRAR on half of the test scenarios, and successRAR on the other half.**](#_Toc47706989)  [**Proposal 5: RAN4 to consider the test cases presented in Table 5.**](#_Toc47706990)  Table 5 Proposed 2-step RA type test cases   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | Test case | | | | Clause | Responsible company | | EN-DC | FR1 NR cells | Contention based RA | MsgB with fallbackRAR | A.4.3.2.2.3 |  | | Non-contention based RA | MsgB with successRAR | A.4.3.2.2.4 |  | | FR2 NR cells | Contention based RA | MsgB with successRAR | A.5.3.2.2.3 |  | | Non-contention based RA | MsgB with fallbackRAR | A.5.3.2.2.4 |  | | NR SA | FR1 NR cells | Contention based RA | MsgB with successRAR | A.6.3.2.2.3 | Nokia | | Non-contention based RA | MsgB with fallbackRAR | A.6.3.2.2.4 |  | | FR2 NR cells | Contention based RA | MsgB with fallbackRAR | A.7.3.2.2.3 | Nokia | | Non-contention based RA | MsgB with successRAR | A.7.3.2.2.4 |  |   [**Observation 5:** The existing 4-step RA type test configurations include FR1 and FR2 scenarios for CBRA and CFRA, as well as SSB-based and CSI-RS based random access.](#_Toc47706991)  [**Proposal 6: Define 2 new 2-step RA type specific configurations for FR1 and FR2, CBRA and CFRA and SSB-based random access in clause A.3.8 as described in Table 6.**](#_Toc47706992)   |  |  | | --- | --- | | Configuration Clause | Description | | A.3.8.2.1 FR1 PRACH configuration 1 | SSB-based contention based 4-step RA type in FR1. | | A.3.8.2.2 FR1 PRACH configuration 2 | SSB based non-contention based 4-step RA type in FR1. | | A.3.8.2.3 FR1 PRACH configuration 3 | CSI-RS based non-contention based 4-step RA type in FR1. | | A.3.8.2.4 FR1 PRACH configuration 4 | CSI-RS based non-contention based 4-step RA type in FR1 to convey BFR. | | A.3.8.2.5 FR1 PRACH configuration 5 | **SSB-based contention based 2-step RA type in FR1** | | A.3.8.2.6 FR1 PRACH configuration 6 | **SSB based non-contention based 2-step RA type in FR1** | | A.3.8.3.1 FR2 PRACH configuration 1 | SSB-based contention based 4-step RA type in FR2. | | A.3.8.3.2 FR2 PRACH configuration 2 | SSB based non-contention based 4-step RA type in FR2. | | A.3.8.3.3 FR2 PRACH configuration 3 | CSI-RS based non-contention based 4-step RA type in FR2. | | A.3.8.3.4 FR2 PRACH configuration 4 | CSI-RS based non-contention based 4-step RA type in FR2 to convey BFR. | | A.3.8.3.5 FR2 PRACH configuration 5 | **SSB-based contention based 2-step RA type in FR2.** | | A.3.8.3.6 FR2 PRACH configuration 6 | **SSB-based non-contention based 2-step RA type in FR2.** |   **[Proposal 7: RAN4 to consider the Draft CR containing FR1 Configuration 5, and Contention-based NR standalone case in FR1 in [3] as baseline for discussion.](#_Toc47706993)**  [**Observation 6:** Current RRM tests of RRM procedures other RACH are generic enough to cover both 2-step and 4-step RA types. Since they rely on the timing of the first PRACH transmission, they will not be affected when applying the 2-step RA type.](#_Toc47706994)  [**Proposal 8: No further 2-step RA type-specific RRM tests are specified for Handover, RRC re-establishment, RRC connection with redirection and PSCell addition.**](#_Toc47706995) |
| R4-2009684 | ZTE Corporation | [draftCR] Test cases for 2-step RACH (Random access) |
| R4-2009685 | ZTE Corporation | **Proposal 1: Use 4-step RA case as starting point and apply changes accordingly where there is difference.**  **Proposal 2: Discuss the test cases for 2-step random access using the prepared draft CR and capture agreements in it.** |
| R4-2010909 |  | Draft CR on 2-step RA type Contention based random access test in FR1 for NR standalone |

## Open issues summary

### Sub-topic 2-1 Scope of test cases

**Issue 2-1: Random access**

* Proposals
  + Option 1: Defines performance tests for both CBRA and CFRA of 2-step RACH. (ZTE, Qualcomm, Ericsson, Nokia)
* Recommended WF
  + Support Option 1.

**Issue 2-2: Behaviour after MsgB**

* Proposals
  + Option 1: Performance tests should check UE’s performance regarding fallbackRAR and successRAR.(Qualcomm, Nokia)
* Recommented WF
  + Support Option 1

**Issue 2-3: How to cover fallbackRAR and successRAR**

* Proposals
  + Option 1: Specify half of the tests with successRAR and the other half with fallbackRAR in order to reduce the number of tests as in the table bellow (Nokia)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Test case | | | | Clause |
| EN-DC | FR1 NR cells | Contention based RA | MsgB with fallbackRAR | A.4.3.2.2.3 |
| Non-contention based RA | MsgB with successRAR | A.4.3.2.2.4 |
| FR2 NR cells | Contention based RA | MsgB with successRAR | A.5.3.2.2.3 |
| Non-contention based RA | MsgB with fallbackRAR | A.5.3.2.2.4 |
| NR SA | FR1 NR cells | Contention based RA | MsgB with successRAR | A.6.3.2.2.3 |
| Non-contention based RA | MsgB with fallbackRAR | A.6.3.2.2.4 |
| FR2 NR cells | Contention based RA | MsgB with fallbackRAR | A.7.3.2.2.3 |
| Non-contention based RA | MsgB with successRAR | A.7.3.2.2.4 |

* + Option 2: Specify separate tests for CBRA and CFRA, FR1 and FR2, and for EN-DC and NR-SA.
* Recommended WF
  + Support Option 1

**Issue 2-4: Handover**

* Proposals
  + Option 1: Don’t define test cases for 2-step RA under handover. (ZTE, Qualcomm, Nokia)
  + Option 2: Define test cases for 2-step RA under handover. (Ericsson)
* Recommended WF
  + Support Option 1.

**Issue 2-5: RRC re-establishment, RRC connection with redirection and PSCell addition**

* Proposals
  + Option 1: Don’t define test cases for 2-step RA under RRC re-establishment, RRC connection with redirection and PSCell addition. (ZTE, Qualcomm, Ericsson, Nokia)
* Recommended WF:
  + Support Option 1.

**Issue 2-6: UL transmit timing**

* Proposals
  + Option 1: Performance tests should check the accuracy of transmit timing of both msgA-PRACH and msgA-PUSCH. (Qualcomm)
  + Option 2: Don’t define test cases for UL transmit timing for 2-step RA. (Ericsson)
* Recommended WF:
  + Discuss further.

### Sub-topic 2-2 Work split

**Issue 2-7: Work Split**

* Proposals
  + Option 1: Finalize work split based on the table below:

|  |  |
| --- | --- |
| A.3.8 PRACH configurations | Company A |
| A.4.3.2.2 Random Access | Company B |
| A.5.3.2.2 Random Access | Company C |
| A.6.3.2.2 Random Access | ZTE |
| A.7.3.2.2 Random Access | Company E |

* + Option 2: Finalize work split based on the table below:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Test case | | | | Clause | Responsible company |
| EN-DC | FR1 NR cells | Contention based RA | MsgB with fallbackRAR | A.4.3.2.2.3 |  |
| Non-contention based RA | MsgB with successRAR | A.4.3.2.2.4 |  |
| FR2 NR cells | Contention based RA | MsgB with successRAR | A.5.3.2.2.3 |  |
| Non-contention based RA | MsgB with fallbackRAR | A.5.3.2.2.4 |  |
| NR SA | FR1 NR cells | Contention based RA | MsgB with successRAR | A.6.3.2.2.3 | Nokia |
| Non-contention based RA | MsgB with fallbackRAR | A.6.3.2.2.4 |  |
| FR2 NR cells | Contention based RA | MsgB with fallbackRAR | A.7.3.2.2.3 | Nokia |
| Non-contention based RA | MsgB with successRAR | A.7.3.2.2.4 |  |

* Recommended WF
  + Discussion is needed to reach consensus. Note that the work split might be impacted by the outcome of Sub-topic 2-1. Suggest to go with Option 1 and companies can volunteer to take care of certain chapters.

### Sub-topic 2-3

**Issue 2-8: Naming of new clauses for 2-step RA test cases**

* Proposals
  + Option 1: Use “A.x.3.2.2A”, such as: (Ericsson)
* **A.4.3.2.2A (EN-DC FR1)**
* **A.5.3.2.2A (EN-DC FR2)**
* **A.6.3.2.2A (SA FR1)**
* **A.7.3.2.2A (SA FR2)**
  + Option 2: Create A.x.3.2.2.3 and A.x.3.2.2.4 for 2-step RA test cases (ZTE, Nokia)
* Recommended WF
  + Discussion is needed to reach consensus. Suggest to go with Option 2 since no other test cases are named with an ending “A” and this is consistent with core requirements.

### Sub-topic 2-4 Test parameters

**Issue 2-9: Test parameters for FR2**

* Proposals
  + Option 1: The test cases of 2-step RACH should use AWGN propagation condition, setup 2b for AoA and rough UE beams. (Qualcomm)
* Recommended WF
  + Support Option 1.

**Issue 2-10: New configurations needed for 2-step RACH**

* **Proposals**
  + **Option 1: Create new configurations for SSB-based CBRA and CFRA in FR1 and FR2 as (Nokia)**
    - **A.3.8.2.5 FR1 PRACH configuration 5** 
      * **Configuration with SSB-based contention based 2-step RA type in FR1**
    - **A.3.8.2.6 FR1 PRACH configuration 6**
      * **Configuration with SSB based non-contention based 2-step RA type in FR1**
    - **A.3.8.3.5 FR2 PRACH configuration 5**
      * **Configuration with SSB-based contention based 2-step RA type in FR2.**
    - **A.3.8.3.6 FR2 PRACH configuration 6** 
      * **Configuration with SSB-based non-contention based 2-step RA type in FR2.**
  + **Option 2: Other**
* **Recommended WF**
  + **Support Option 1.**

## Companies views’ collection for 1st round

### Open issues

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| --- | --- |
| **Company** | **Comments** |
| XXX | Issue 2-1:  Issue 2-2:  Issue 2-3:  Issue 2-4:  Issue 2-5:  Issue 2-6:  Issue 2-7: |

### CRs/TPs comments collection

*Major close to finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

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| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2009684 | Company A |
| Company B |
|  |
| R4-2010909 | Company A |
| Company B |
|  |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

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|  | **Status summary** |
| **Sub-topic#1** | *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:* |

*Suggestion on WF/LS assignment*

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| --- | --- | --- |
|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 |  |  |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provided recommendation on CRs/TPs Status update suggestion*

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| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
| XXX | *Based on 2nd round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |