**3GPP TSG-RAN WG4 Meeting # 97-e R4-2017005**

**Electronic Meeting, 2-13 November, 2020**

**Agenda item:** 7.1.7.1 & 7.1.7.2

**Source:** Moderator (Nokia, Nokia Shanghai Bell)

**Title:** Email discussion summary for [97e][206]NR\_unlic\_RRM\_2

**Document for:** Information

# Introduction

This is the document for the email discussion of the following items under the NR-U RRM agenda:

7.1.7 RRM perf. requirements (38.133) [NR\_unlic-Perf]

7.1.7.1 General [NR\_unlic-Perf]

7.1.7.2 Test cases [NR\_unlic-Perf]

The following topics and sub-topics are treated in this summary:

Topic #1: Measurement Accuracy

Sub-topic 1-1: RSSI & Channel occupancy measurements

Topic #2: NR-U RRM test configurations

Sub-topic 2-1: Wideband operation mode for RRM tests

Sub-topic 2-2: LBT model during RRM tests

Sub-topic 2-3: Number of Cells and Frequency range

Topic #3: NR-U RRM test cases

Sub-topic 3-1: Specification Structure

Sub-topic 3-2: RRM tests scope and applicability rules

Sub-topic 3-3: Test case list

Sub-topic 3-4: Work Plan & Work Split

Guidance to first round discussions:

* Companies to provide comments on the open issues and CRs in this document.
* Please note that the template was changed. Comments are now collected within the specific issues.

Guidance to second round discussions:

* Companies to provide comments on the open issues in this document.
* The discussion on the WF and revised CRs will be done in the e-mail reflector, in separate e-mail threads, as in the previous meetings. These discussions need to be kicked off by the responsible companies.
* In the second round, the work split will also be discussed

# Topic #1: Measurement Accuracy

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2015526**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015526.zip) | Huawei, HiSilicon | **Proposal 1: The RSSI measurement shall be performed over unified measurement BW.**  **Proposal 2: The RSSI measurement accuracy requirements shall follow the same requirements for LAA.** |
| [**R4-2015391**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015391.zip) | Nokia, Nokia Shanghai Bell | 1. RAN1 defined the RSSI measurement bandwidth as the channel bandwidth defined in 37.213. In 37.213, clause 4, the definition of a channel is: “A channel refers to a carrier or a part of a carrier consisting of a contiguous set of resource blocks (RBs) on which a channel access procedure is performed in shared spectrum.”. Therefore, in RAN1 specification, the channel bandwidth is the LBT bandwidth. 2. RAN4 has agreed that the UE shall not normalize the RSSI measurement for reporting purpose. 3. The only way to have consistent information about the RSSI measurement both at the gNB and at the UE is to define that the RSSI measurement bandwidth is the one already specified by RAN1. 4. The RSSI measurement bandwidth is the LBT bandwidth. 5. The agreed RSSI measurement report mapping in NR-U uses the same table as the one defined for LTE-LAA. 6. Define RSSI measurement accuracy requirements in NR-U to be the same as in LTE-LAA. |
| [**R4-2016566**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016566.zip) | Qualcomm | **Proposal 1. There is no need to specify RSSI measurement bandwidth for the UE.**  **Proposal 2. The RSSI measurement accuracy requirements for NR-U are the same as for CLI-RSSI as specified in Section 10.1.22.2 in TS 38.133 (and for RSSI measurements in Section 9.1.18.5 in TS 36.133)** |
| R4-2014012 | ZTE Corp. | **Proposal 2: The RSSI measurement bandwidth shall be the LBT bandwidth** |

## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic 1-1: RSSI & Channel occupancy measurements

Issues to be treated in this sub-topic:

Issue 1-1-1: RSSI Measurement Bandwidth

Issue 1-1-2: RSSI Measurement Accuracy

#### Issue 1-1-1: RSSI Measurement Bandwidth

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| **Issue 1-1-1: RSSI measurement bandwidth**   * **Background:** during the RRM Core requirements phase, the RSSI measurement bandwidth was discussed, but no agreement was reached. The WF from last meeting is: * ***Issue 2-2-1: RSSI measurement BW*** * Candidate options:   + Option 1: RSSI measurement bandwidth is the LBT bandwidth   + Option 2: The discussion can take place in the performance work * Background from TS 38.215:   + Received Signal Strength Indicator (RSSI), comprises the linear average of the total received power (in [W]) observed only per configured OFDM symbol and in the measurement bandwidth corresponding to the channel bandwidth defined in Clause 4 of TS 37.213 [17], where the channel has the center frequency configured by ARFCN-valueNR, by the UE from all sources, including co-channel serving and non-serving cells, adjacent channel interference, thermal noise etc. * Background from RAN4 94e bis:   + UE shall not normalize RSSI measurements for reporting purpose * Proposals   + Option 1: The RSSI measurement shall be performed over unified measurement BW.     - (Huawei, HiSilicon, R4-2015526):   + Option 2: The RSSI measurement bandwidth shall be the LBT bandwidth.     - (Nokia, Nokia Shanghai Bell, R4-2015391, ZTE Corp, R4-2014012):   + Option 3 There is no need to specify RSSI measurement bandwidth for the UE.     - (Qualcomm, R4-2016566) * Recommended WF   + Considering that it was already decided in RAN1 that the RSSI measurement Bandwidth is the LBT bandwidth, the recommended WF is:     - **The RSSI bandwidth is the LBT bandwidth.**   *Agreement from the GTW session on November 3rd, 2020:*  Agreement: RSSI Measurement Bandwidth is the bandwidth defined in TS 38.215 RSSI measurement definition (i.e. “the measurement bandwidth corresponding to the channel bandwidth defined in Clause 4 of TS 37.213 [17]”) |
| ZTE: We support the recommended WF. |
| MediaTek: Agree with Option 3. not need to be specified further, and it can be captured in the test case. |
| Ericsson: Agree with the recommended WF, which is aligned with TS 38.215. |
| Apple: support option 2. |
| Huawei: It seems companies still have different understanding about the measure bandwidth even with the reference to TS 37.213. Maybe LS to RAN1 is needed. |
| Nokia: This was agreed in the GTW session. |

#### Issue 1-1-2: RSSI Measurement Accuracy

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| **Issue 1-1-2: RSSI measurement accuracy**   * Proposals   + Option 1: The RSSI measurement accuracy requirements shall follow the same requirements as for LAA     - (Nokia, Nokia Shanghai Bell, R4-2015391): Define RSSI measurement accuracy requirements in NR-U to be the same as in LTE-LAA.     - (Huawei, HiSilicon, R4-2015526): The RSSI measurement accuracy requirements shall follow the same requirements for LAA.     - (Qualcomm, R4-2016566): The RSSI measurement accuracy requirements for NR-U are the same as for CLI-RSSI as specified in Section 10.1.22.2 in TS 38.133 (and for RSSI measurements in Section 9.1.18.5 in TS 36.133) * Recommended WF   + - **Agree on Option 1.**   *Agreement from the GTW session on November 3rd, 2020:*  Agreement: Define RSSI measurement accuracy requirements in NR-U to be the same as in LTE-LAA. |
| MediaTek: Agree with Option 1. |
| Ericsson: agree with option 1 |
| Apple: agree on option 1. |

## Companies views’ collection for 1st round

### Open issues

Comments to open issues should be captured within the Issues. Please do not add any comment in this section.

### 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** |
| [**R4-2016418**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016418.zip) | **Measurement accuracy requirements for NR-U, Ericsson** |
| Apple: Shall NR-U accuracy section ID follows the same naming rule as core requirement? E.g. 10.1.2A instead of 10.1.27? |
| Nokia: this CR can be revisited in the 2nd round. We would prefer to keep the clause numbers open, given that other WIs might be discussing the accuracy requirements as well, and we agree with Apple’s comment. We should discuss the clause number of these requirements, to ensure that the specification is consistent. Additionally, we prefer the RSSI accuracy requirements as written in CR R4-2015525. |
| [**R4-2015525**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015525.zip) | **CR on RSSI and CO performance requirements for NR-U, Huawei, HiSilicon** |
| Nokia: this CR and CR R4-2016418 bring text for overlapping accuracy requirements. We can revisit this on the 2nd round |
| 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:* |

*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: NR-U RRM test configurations

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2014871**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014871.zip) | MediaTek | ***Observation 1:*** *The requirement will be not applicable when exceeding the Lmax or certain number of consecutive LBT failures occur.*  ***Observation 2:*** *The most stringent case would be during the SCell activation with Trs > 40 ms, the requirement is not applicable when 2 consecutive LBT failures occur during the fine time tracking stage.*  ***Proposal 1:*** *For RRM test cases for NR-U, exceeding Lmax should be avoided.*  ***Proposal 2:*** *For the cell-reselection test cases, Mp consecutive DRX cycles with LBT failures of the serving cell should be avoided.*  ***Proposal 3:*** *For test cases with DRX in use, the LBT can be modelled as either all SMTCs are with available SSBs or all SMTCs are with no SSBs available during one DRX cycle.*  ***Proposal 4:*** *It is assumed DL wideband operation Mode 1 is used during RRM tests for NR-U.* |
| [**R4-2015391**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015391.zip) | Nokia, Nokia Shanghai Bell | 1. Core requirements were modified to take into account DL or UL LBT failure during procedures. 2. Additionally, new core requirements were created, such as: UL BWP switch due to consistent UL CCA failure 3. In LTE-LAA a simple LBT model was defined for the RRM test cases, in which the transmission equipment would determine whether to transmit a discovery reference signal within a DMTC based on a probability P=0.75. 4. In NR-U, besides the definition of the LBT success within a DRS transmission window, the candidate position in which a given SSB is transmitted also needs to be taken into account in the LBT model. Differentiation between LBE and FBE should be ensured in the test cases. 5. RAN4 to differentiate LBE and FBE DL LBT models. 6. For LBE test cases: RAN4 to adopt the following DL LBT model: 1) Define a probability of P=0.75 for the transmission of the DRS in the first candidate position. 2) In case of LBT failure for transmission in the first candidate position, define a probability of P = 0.75 for the transmission in the second candidate position for a given SSB index. 7. For FBE test cases: RAN4 to define a DL LBT model that considers a probability of P = 0.75 for the transmission of each DRS. Only the first SSB candidate position for a given SSB index shall be considered in these tests. 8. There are several requirements that depend on the UL LBT failure. 9. The only way to test UL LBT failure at the UE, is by the test equipment injecting a sufficiently high interference precisely at the time the UE should transmit. 10. RAN4 to discuss a methodology to test UL LBT failures in RRM tests. |
| [**R4-2016415**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016415.zip) | Ericsson | * ***Proposal 6****:*    + *Scenario A:* ***at least two*** *cells (at least two frequencies) – NR Pcell and NR-U Scell, but depending on the requirement also:*     - *NR-U eighbour cell (e.g., for eighbour cell measurements)*   + *Scenario B:* ***at least two*** *cells (at least two frequencies) – E-UTRA Pcell and NR-U PSCell, but depending on the requirement also:*     - *NR-U Scell in some test cases (e.g., CA-related), or*     - *NR-U eighbour cell (e.g., for eighbour cell measurements)*   + *Scenario C:* ***at least one*** *serving or target NR-U cell (at least one frequency), but depending on the requirement also:*     - *NR-U Scell in some test cases (e.g., CA-related), or*     - *NR-U/NR/E-UTRA target cell (e.g., for HO from NR-U cell), or*     - *NR-U/NR/E-UTRA eighbour cell (e.g., for eighbour cell measurements), or*     - *Serving NR/E-UTRA cell (e.g., for HO to target NR-U cell)* * ***Proposal 7****: NR cells in NR-U test cases (e.g., for HO or in scenario A or for measurements) are always in FR1.* |

## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic 2-1: Wideband operation mode for RRM tests

Issues to be treated in this sub-topic:

Issue 2-1-1: Whether to test wideband operation in RRM tests

#### Issue 2-1-1: Whether to test wideband operation in RRM tests

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| **Issue 2-1-1: Whether to test wideband operation in RRM tests**  **Background, from R1-2004965 on the different wideband operation modes.**  **The following DL wideband operation cases are discussed.**  **• DL Case 1: Intra-band CA**  **• DL Case 2: Wideband carrier operation Modes 2/3 without scheduling intra-cell guard bands**  **o DL Case 2a: Mode 2 where single wideband carrier when LBT is successful in a subset of the LBT sub-bands which are contiguous [1]**  **o DL Case 2b: Mode 3 where single wideband carrier when LBT is successful in a subset of the LBT sub-bands which are non-contiguous [1]**  **• DL Case 3: Wideband carrier operation Modes 2/3 with scheduling intra-cell guard bands between transmitted contiguous LBT sub-bands**  **• DL Case 4: Wideband carrier operation Mode 1 where single carrier wideband operation when LBT is successful in all LBT sub-bands [1]**   * Proposals   + Option 1: It is assumed DL wideband operation Mode 1 is used during RRM tests for NR-U.     - (MediaTek, R4-2014871) * Recommended WF   + - **Discuss the proposal in the first round.** |
| MediaTek: Agree with Option 1 as the proponent company. Mode 1 is the simplest wideband operation mode and it can be the baseline UE implementation for NR-U.  The wideband operation is considered in the test because BW of 40 MHz is used in the current test confi. Of TDD with 30 kHz SCS, and thus it will be 2 LBT BW. An example shared as follows:   |  |  | | --- | --- | | **Configuration** | **Description** | | 1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | | 2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode | | 3 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | |
| Apple: fine with option1. |
| Nokia: we are also fine with assuming DL wideband operation Mode 1. Maybe on the final wording of the agreement, we can clarify that mode 1 is: single carrier wideband operation when LBT is successful in all LBT sub-bands. |

### Sub-topic 2-2: LBT model during RRM tests

Issues to be treated in this sub-topic:

Issue 2-2-1: Differentiation between FBE and LBE

Issue 2-2-2: DL LBT model for **LBE** operation

Issue 2-2-3: DL LBT model for **FBE** operation

Issue 2-2-4: DL LBT model when DRX is in use

Issue 2-2-5: Exceeding Lmax values during RRM tests

Issue 2-2-6: Consecutive DL LBT failures during cell-reselection test cases

Issue 2-2-7: UL LBT model

#### Issue 2-2-1: Differentiation between FBE and LBE

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| **Issue 2-2-1: Differentiation between FBE and LBE**  **Background, from RAN4 96e:**   |  | | --- | | RAN4 96 e  Agreements  • No differentiation between UE in FBE and LBE modes in NR-U RRM Core requirements.  • Different test case will be defined for UE in FBE and LBE modes in NR-U RRM Performance requirements. |  * Proposals   + Option 1: RAN4 to differentiate LBE and FBE DL LBT models in RRM tests. RAN4 to design different test cases covering LBE and FBE channel access.     - Nokia, Nokia Shanghai Bell, R4-2015391 * Recommended WF   + - **Discuss the proposal in the first round.**   *Agreement from the GTW session on November 3rd, 2020:*  Agreement: Further identify the set of requirements for which LBE and FBE test cases shall be differentiated. |
| MediaTek: Option 1 is reasonable. Besides, common part of LBE/FBE LBT model will still be helpful for maintenance. |
| Ericsson: LTE LBT modelling approach can be taken as a baseline, with some necessary updates. The probabilities can be FFS in this meeting. |
| Apple: fine with option 1. |
| Huawei: Different LBT model for LBE and FBE in each test cases. The applicable rules for UE which is capable both LBE and FBE is needed. |
| Qualcomm: Agree that different LBT models are needed for LBE and FBE based channel access modes. Whether a single or separate test case are needed to cover LBE and FBE modes should be decided on a case to case basis. |

#### Issue 2-2-2: DL LBT model for **LBE** operation

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| **Issue 2-2-2: DL LBT model for LBE operation**   * Proposals   + Option 1: For LBE test cases: RAN4 to adopt the following DL LBT model: 1) Define a probability of P=0.75 for the transmission of the DRS in the first candidate position. 2) In case of LBT failure for transmission in the first candidate position, define a probability of P = 0.75 for the transmission in the second candidate position for a given SSB index.     - Nokia, Nokia Shanghai Bell, R4-2015391 * Recommended WF   + - **Discussion depends on issue 2-2-1, but companies are encouraged to provide their views in the 1st round as well.** |
| MediaTek: Option 1 is reasonable when DRX is not used. It should FFS when DRX in use. |
| Ericsson: LTE LBT modelling approach can be taken as a baseline, with some necessary updates. The probabilities can be FFS in this meeting. |
| Apple: fine with option 1. |
| Huawei: If the probability model is to use, the UE’s behaviour in each test may different. (sometimes abandon the process) |
| Qualcomm: The overall procedure seems fine, but the probability values need some discussion. |
| Nokia: We are fine with Ericsson’s and MediaTek’s comments. Also, the chairman has mentioned in the GTW discussion we should strive to identify model parameters and candidate values, which can be done in the 2nd round. |

#### Issue 2-2-3: DL LBT model for **FBE** operation

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| **Issue 2-2-3: DL LBT model for FBE operation**   * Proposals   + Option 1: For FBE test cases: RAN4 to define a DL LBT model that considers a probability of P = 0.75 for the transmission of each DRS. Only the first SSB candidate position for a given SSB index shall be considered in these tests.     - Nokia, Nokia Shanghai Bell, R4-2015391 * Recommended WF   + - **Discussion depends on issue 2-2-1, but companies are encouraged to provide their views in the 1st round as well.** |
| MediaTek: Option 1 is reasonable when DRX is not used. It should FFS when DRX in use. |
| Ericsson: LTE LBT modelling approach can be taken as a baseline, with some necessary updates. The probabilities can be FFS in this meeting. |
| Apple: may assume no LBT failure in FBE for simplicity. |
| Qualcomm: The overall procedure looks fine. But the probability value needs discussion. Since FBE is deployed in a controlled environment where no interference from WiFi is guaranteed, the probability of gaining channel access in FBE mode must be greater than that in LBE mode. |
| Nokia: As in issue 2-2-3, we are fine with Ericsson’s and MediaTek’s comments. For Apple comment: we do not agree. Some UEs might support only FBE channel access. The greatest difference between operation in license and unlicensed spectrum is the LBT, which might cause signals to be unavailable. Most of the requirements were defined considering this fact and should be tested. |

#### Issue 2-2-4: DL LBT model when DRX is in use

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| **Issue 2-2-4: DL LBT model when DRX is in use**   * Proposals   + Option 1: For test cases with DRX in use, the LBT can be modelled as either all SMTCs are with available SSBs or all SMTCs are with no SSBs available during one DRX cycle..     - MediaTek R4-2014871 * Recommended WF   + - **Discuss the proposal. Is Option 1 agreeable?** |
| MediaTek: Support Option 1 as the proponent company. The core requirement in IDLE mode will be extended according to the number of “ DRX cycles with at least one SMTC where there are no SSBs available at the UE”. Thus, to consider the SMTCs within a DRX cycles are all available or not available can simplify the test setting. |
| Ericsson: Need to solve for the non-DRX first. We do not agree that the requirements should be generally in DRX cycles. |
| Apple: fine with option 1 |
| Nokia: We do not agree with Option 1, and agree with Ericsson’s comments. |

#### Issue 2-2-5: Exceeding Lmax values during RRM tests

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| **Issue 2-2-5: Exceeding Lmax values during RRM tests**  **Background from R4-2014871:**  *in NR-U, when exceeding the Lmax or consecutive LBT failures occur, some UE behavior would be triggered, e.g. e.g. restart/initiate the measurement, or the requirement will be not applicable. Thus, the test cannot be complete to achieve the test purpose.*  *Observation 1:* ***The requirement will be not applicable when exceeding the Lmax or certain number of consecutive LBT failures occur.***  *Observation 2:* ***The most stringent case would be during the SCell activation with Trs > 40 ms, the requirement is not applicable when 2 consecutive LBT failures occur during the fine time tracking stage.***   * Proposals   + Option 1: For RRM test cases for NR-U, exceeding Lmax should be avoided.     - MediaTek R4-2014871 * Recommended WF   + - **Discuss the proposal. Is Option 1 agreeable?** |
| ediaTek: Support Option 1 as the proponent company. Exceeding Lmax would make the requirements not applicable. |
| Ericsson: there are some UE behaviours defined upon exceeding the Lmax, so why this should be avoided? |
| Apple: fine with option 1 |
| Qualcomm: Fine with the proposal, but agree with Ericsson that some UE behaviours might be triggered on exceeding the Lmax values and need to be tested. |
| Nokia: Option 1 is not agreeable. For different requirements, new UE behaviors were defined upon exceeding Lmax. What we can do is to make a list to identify which requirements and new UE behaviors need to be tested when exceeding Lmax, and, if there are any requirements that can be tested without exceeding Lmax. |

#### Issue 2-2-6: Consecutive DL LBT failures during cell-reselection test cases

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| **Issue 2-2-6: Consecutive DL LBT failures during cell-reselection test cases**  **Background from R4-2014871:**  *in NR-U, when exceeding the Lmax or consecutive LBT failures occur, some UE behavior would be triggered, e.g. e.g. restart/initiate the measurement, or the requirement will be not applicable. Thus, the test cannot be complete to achieve the test purpose.*  *Observation 1:* ***The requirement will be not applicable when exceeding the Lmax or certain number of consecutive LBT failures occur.***  *Observation 2:* ***The most stringent case would be during the SCell activation with Trs > 40 ms, the requirement is not applicable when 2 consecutive LBT failures occur during the fine time tracking stage.***   * Proposals   + Option 1: For the cell-reselection test cases, Mp consecutive DRX cycles with LBT failures of the serving cell should be avoided.     - MediaTek R4-2014871 * Recommended WF   + - **Discuss the proposal. Is Option 1 agreeable?** |
| ZTE: The proposal is in general agreeable. Furthermore, we can discuss a value of the unavailable DRX cycles. |
| MediaTek: Support Option 1 as the proponent company. When Mp consecutive DRX cycles with LBT failures, UE will initiate measurements on neighbour cells indicated by the serving cell and may not be able to complete the original cell reselection. |
| Ericsson: See no strong reason to avoid this in testing. |
| Apple: fine with option 1 |
| Nokia: We also do not see why we should avoid this in testing. |

#### Issue 2-2-7: UL LBT model

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| **Issue 2-2-6: Consecutive DL LBT failures during cell-reselection test cases**  **Background from R4-2014391:**  *Observation 5: There are several requirements that depend on the UL LBT failure.*  *Observation 6: The only way to test UL LBT failure at the UE, is by the test equipment injecting a sufficiently high interference precisely at the time the UE should transmit.*   * Proposals   + Option 1: RAN4 to discuss a methodology to test UL LBT failures in RRM tests.     - Nokia, Nokia Shanghai Bell R4-2015391 * Recommended WF   + - **Discuss the proposal. Is Option 1 agreeable?** |
| MediaTek: Support Option 1.  On Observation 6, the interference may not need to be precisely at the time the UE should transmit. It would be also ok to have interference covering longer time period before the UL transmission. |
| Ericsson: agree that this needs to be discussed, but not necessarily agree with the further details in Nokia’s view. |
| Apple: fine, but we may only choose one typical test case to check this functionality, e.g. LBT failure on RACH during HO. |
| Nokia: the observations are only to provide some background on this discussion, since this was the only submission on this issue and this is the first time it is discussed in RAN4, and are not included in the proposal. The idea of the proposal is just to bring this topic to RAN4 discussion. We think UL LBT needs to be somehow included in the tests, but the way to do this needs further discussion. |

### Sub-topic 2-3: Number of Cells and Frequency range

Issues to be treated in this sub-topic:

Issue 2-3-1: Frequency range

Issue 2-3-2: Number of cells

#### Issue 2-3-1: Frequency range

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| **Issue 2-3-1: Frequency range**   * Proposals   + Option 1: NR cells in NR-U test cases (e.g., for HO or in scenario A or for measurements) are always in FR1.     - (Ericsson, R4-2016415) * Recommended WF   + - **Agree on:** NR cells in NR-U test cases (e.g., for HO or in scenario A or for measurements) are always in FR1. |
| MediaTek: Agree with Recommended WF. It simplifies the scenarios. |
| Ericsson: Support option 1. |
| Apple: fine with option 1 |
| Qualcomm: Agree with the WF. |
| Nokia: also agree with the WF. |

#### Issue 2-3-2: Number of cells

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| **Issue 2-3-2: Number of cells**   * Proposals   + Option 1 (Ericsson, R4-2016415):   + Scenario A: **at least two** cells (at least two frequencies) - NR PCell and NR-U SCell, but depending on the requirement also:     - NR-U neighbor cell (e.g., for neighbor cell measurements)   + Scenario B: at **least two cells** (at least two frequencies) - E-UTRA PCell and NR-U PSCell, but depending on the requirement also:     - NR-U SCell in some test cases (e.g., CA-related), or     - NR-U neighbor cell (e.g., for neighbor cell measurements)   + Scenario C: **at least one** serving or target NR-U cell (at least one frequency), but depending on the requirement also:     - NR-U SCell in some test cases (e.g., CA-related), or     - NR-U/NR/E-UTRA target cell (e.g., for HO from NR-U cell), or     - NR-U/NR/E-UTRA neighbor cell (e.g., for neighbor cell measurements), or     - Serving NR/E-UTRA cell (e.g., for HO to target NR-U cell) * Recommended WF   + - **Discuss the proposal. Is Option 1 agreeable? If not, provide your views on what could be agreeable.** |
| ZTE: I think what Ericsson proposed can be agreed as a baseline and we can keep it as the working assumption. Later on we may need to adjust if problems arise. For now the principle seems fine to us. |
| MediaTek: Fine with Scenario A & B in Option 1.  One comment on the 2nd bullet of scenario C, target cell to be NR-U cell would be more meaningful rather than NR/E-UTRA cell for NR-U test. E.g. the HO requirements will be the same as R15 if the target cell is NR/E-UTRA cell. |
| Ericsson: support option 1 |
| Apple: fine with option 1 |
| Qualcomm: Fine with the proposal |
| Nokia: We can support option 1 as well as baselines. Details can be discussed within the specific test cases |

## Companies views’ collection for 1st round

### Open issues

Comments to open issues should be captured within the Issues. Please do not add any comment in this section.

### 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.*

## 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.*

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

*Suggestion on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **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*

|  |  |
| --- | --- |
| **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”* |

# Topic #3: NR-U RRM test cases

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2016415**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016415.zip) | Ericsson | * ***Proposal 1****: The work on NR-U RRM test cases is divided into at least two phases.* * ***Proposal 2****: RAN4 will develop test cases for all scenarios applicable for a given requirement.* * ***Proposal 3****: RAN4 will discuss applicability rules when test cases have sufficiently progressed, e.g.:*   + *FFS: for a UE capable of multiple scenarios, the UE shall pass the test to verify the same requirements on the same type of cell (e.g. UE timing accuracy) in only one scenario.* * ***Proposal 4****: Develop new sections for common test parameters in NR-U RRM test cases according to the table:*   **Table 1: New top-level general configurations sections for NR-U test cases**   |  |  | | --- | --- | | **New section** | **Title** | | A.3.1.\* | … under CCA | | A.3.2.3 | Generic OFDMA Channel Noise Generator (OCNG) under CCA | | A.3.7B | EN-DC test setup with PSCell under CCA | | A..3.8.4 | PRACH configuration under CCA | | A.3.10A | SSB configurations under CCA | | A.3.16A | TCI state configurations under CCA | | A.3.19 | Discovery Burst Transmission Window configuration under CCA | | A.3.20 | Signal transmission model under CCA | | NOTE: “\*” denotes different relevant sub sections | |  * ***Proposal 5****: Create in TS 38.133 the following new top-level sections for NR-test cases:*   + *A.9 NR standalone tests with SCell under CCA and PCell in FR1*   + *A.10 EN-DC tests with NR PSCell under CCA*   + *A.11 NR-U standalone tests with NR PCell under CCA (note: including also NR/E-UTRA measurements and including re-selection in IDLE and HO from NR-U to NR-U/NR/E-UTRA cells and from NR-U/NR to NR-U cells)*   + *A.12 E-UTRA standalone tests with NR-U cells*     - *Inter-RAT E-UTRA–NR-U cell re-selection with NR-U target cell*     - *Inter-RAT E-UTRA–NR-U HO with NR-U target cell*     - *Inter-RAT E-UTRA–NR-U measurements*     - *Inter-RAT SFTD with NR-U neighbor cell* |
| [**R4-2016416**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016416.zip) | Ericsson | ***Proposal 1****: RAN4 develops NR-U test cases, based on the test case list in* ***Table 1****.*  **Table 1: NR-U test cases in TS 38.133**   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **Group of requirements** | **Requirements section** | **Test cases** | **Top section for test cases** | **Phase** | **Volunteer company** | | RRC\_IDLE,  cell re-selection | 4.2A | * NR-U/NR(FR1) -> NR-U * NR-U -> NR(FR1) * NR-U - > E-UTRAN (FDD,TDD) | A.11 | I | Ericsson | | TS 36.133 | * E-UTRAN (FDD,TDD) -> NR-U | A.12 | I |  | | RRC\_INACTIVE, cell re-selection | 5.1A | Not needed | - | - |  | | HO (delay and interruptions) | 6.1B | * NR-U/NR(FR1) -> NR-U | A.11 | I |  | | 6.1.1.2 | * NR-U -> NR(FR1) | A.11 |  | | 6.1.2.1 | * NR-U - > E-UTRAN (FDD,TDD) | A.11 |  | | TS 36.133 | * E-UTRAN (FDD,TDD) -> NR-U | A.12 | I |  | | RRC Re-establishment | 6.2.1A | * NR-U/NR(FR1) -> NR-U | A.11 | II |  | | Random access | 6.2.2A [1] | (*requirements not available yet*)  Contention-based and non-contention based RA:   * to NR-U PCell * to NR-U PSCell | A.10, A.11 | II |  | | RRC Connection Release with Redirection | 6.2.3.2.3 | * NR-U/NR(FR1) -> NR-U | A.11 | II |  | | Timing  (transmit  timing and  timing advance) | 7.1, 7.3 | * NR-U PCell * NR-U PSCell | A.10, A.11 | I |  | | BWP switching  delay and  interruptions | 8.6 | DCI/timer/RRC-based BWP switching on NR-U SCell, with:   * NR PCC (PCC) * NR-U PCC * NR-U PSCC and E-UTRAN PCC (FDD, TDD)   NOTE: verify BWP switching under consistent UL failure. Legacy BWP is to be verified only in SA. | A.9, A.10, A.11 | II | Ericsson | | RLM  (in-syn and  out-of-sync) | 8.1A | * On NR-U PCC * On NR-U PSCC, with E-UTRAN PCC (FDD,TDD) | A.10, A.11 | I | Ericsson | | BM | 8.5A | * On NR-U PCC * On NR-U PSCC, with E-UTRAN PCC (FDD,TDD) | A.9, A.10, A.11 | II | Ericsson | | SCell  activation/  deactivation delay | 8.3A | For known and unknown target NR-U SCell, with:   * NR PCC (FR1) * NR-U PCC * NR-U PSCC and E-UTRAN PCC (FDD, TDD) | A.9, A.10, A.11 | I |  | | PSCell  addition/release  delay | TS 36.133 | For known and unknown target NR-U PSCell, with:   * E-UTRA PCC | A.12 | II |  | | Active TCI  switching delay | 8.10A | For known and unknown target TCI state in NR-U, on:   * NR-U PCC * NR-U SCC, with NR PCC (FR1) * NR-U PSCC, with E-UTRAN PCC (FDD, TDD) | A.9, A.10, A.11 | II |  | | Interruptions | 8.2.1, 8.2.2 | Due to NR-U SCell addition/release, with:   * NR PCC (FR1) * NR-U PCC * NR-U PSCC and E-UTRAN PCC (FDD,TDD) | A.9, A.10, A.11 | I | Ericsson | | 8.2.1, 8.2.2 | Due to NR-U SCell activation/deactivation, with:   * NR PCC (FR1) * NR-U PCC * NR-U PSCC and E-UTRAN PCC (FDD,TDD) | A.9, A.10, A.11 | I |  | | 8.2.1, 8.2.2 | During measurements no deactivated NR-U SCell, with:   * NR PCC (FR1) * NR-U PCC * NR-U PSCC and E-UTRAN PCC (FDD,TDD) | A.9, A.10, A.11 | I |  | | TS 36.133 | Due to inter-RAT SFTD measurements between:   * NR-U PCell and E-UTRAN PCell (FDD,TDD) | A.12 | II |  | | TS 36.133 | Due to NR-U PSCell addition/release, with:   * E-UTRA PCell | A.12 | I |  | | Intra-frequency  measurement  procedure  (SS-RSRP,  SS-RSRQ,  SS-SINR,  L1-RSRP, RSSI,  CO) | 9.2A.5, 9.2A.6 | Intra-frequency SS-RSRP, SS-RSRQ, SS-SINR measurements on:   * NR-U SCC, with NR PCC (FR1) * NR-U PCC * NR-U SCC, with NR-U PCC * NR-U PSCC, with E-UTRAN PCC (FDD,TDD) * NR-U SCC measurements, with E-UTRAN PCC (FDD,TDD) and NR-U PSCC | A.9, A.10, A.11 | I | Ericsson | | [9.5.4A] | L1-RSRP measurements on:   * NR-U SCC, with NR PCC (FR1) * NR-U PCC * NR-U SCC, with NR-U PCC * NR-U PSCC, with E-UTRAN PCC (FDD,TDD) * NR-U SCC measurements, with E-UTRAN PCC (FDD,TDD) and NR-U PSCC | A.9, A.10, A.11 | I | Ericsson | | 9.2A.7.1 | Intra-frequency RSSI measurements on:   * NR-U SCC, with NR PCC (FR1) * NR-U PCC * NR-U SCC, with NR-U PCC * NR-U PSCC, with E-UTRAN PCC (FDD,TDD) * NR-U SCC measurements, with E-UTRAN PCC (FDD,TDD) and NR-U PSCC | A.9, A.10, A.11 | I | Ericsson | | 9.2A.7.2 | Intra-frequency CO measurements on:   * NR-U SCC, with NR PCC (FR1) * NR-U PCC * NR-U SCC, with NR-U PCC * NR-U PSCC, with E-UTRAN PCC (FDD,TDD) * NR-U SCC measurements, with E-UTRAN PCC (FDD,TDD) and NR-U PSCC | A.9, A.10, A.11 | II |  | | Inter-frequency  measurement  procedure  (SS-RSRP,  SS-RSRQ,  SS-SINR,  SFTD,  RSSI, CO) | 9.3A.4, 9.3A.5 | Inter-frequency SS-RSRP, SS-RSRQ, SS\_SINR measurements on:   * NR-U inter-frequency, with NR PCC (FR1) * NR-U inter-frequency, with NR-U PCC * NR-U inter-frequency, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) * NR (FR1) inter-frequency, with NR-U PCC * NR (FR1) inter-frequency, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) | A.9, A.10, A.11 | I |  | | 9.3A.8 | Inter-frequency RSSI measurements on:   * NR-U inter-frequency, with NR PCC (FR1) * NR-U inter-frequency, with NR-U PCC * NR-U inter-frequency, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) | A.9, A.10, A.11 | II |  | | 9.3A.9 | Inter-frequency CO measurements on:   * NR-U inter-frequency, with NR PCC (FR1) * NR-U inter-frequency, with NR-U PCC * NR-U inter-frequency, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) | A.9, A.10, A.11 | II |  | | Inter-RAT  measurement  procedure  (SFTD,  E-UTRA-NR-U  SS-RSRP/  SS-RSRQ/  SS-SINR,  NR-U-E-UTRA  RSRP/RSRQ) | TS 36.133 | Inter-RAT SFTD between:   * E-UTRAN PCell (FDD,TDD) and NR-U neighbor   NOTE: under the condition of stationary paths | A.12 | I | Ericsson | | 9.4.2, 9.4.3 | NR-U-E-UTRA RSRP/RSRQ (needed for HO):   * On E-UTRA (FDD,TDD), with NR-U PCC * On E-UTRA (FDD,TDD), with NR-U PSCC | A.11 | II |  | | TS 36.133 | E-UTRA-NR-U SS-RSRP/SS-RSRQ/SS-SINR:   * On NR-U neighbor, with E-UTRA (FDD,TDD) PCC * On NR-U neighbor, with E-UTRA (FDD,TDD) PCC and NR-U PSCC | A.12 | II |  | | Accuracy  for NR-U  intra-frequency  measurements  (SS-RSRP,  SS-RSRQ,  SS-SINR,  L1-RSRP, RSSI,  CO) | [10.1.27] | Intra-frequency absolute and relative accuracies for SS-RSRP on:   * NR-U SCC, with NR PCC (FR1) * NR-U PCC * NR-U SCC, with NR-U PCC * NR-U PSCC, with E-UTRAN PCC (FDD,TDD) * NR-U SCC, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) | A.9, A.10, A.11 | I |  | | [10.1.29] | Intra-frequency absolute accuracies for SS-RSRQ on:   * NR-U SCC, with NR PCC (FR1) * NR-U PCC * NR-U SCC, with NR-U PCC * NR-U PSCC, with E-UTRAN PCC (FDD,TDD) * NR-U SCC, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) | A.9, A.10, A.11 | II |  | | [10.1.31] | Intra-frequency absolute accuracies for SS-SINR on:   * NR-U SCC, with NR PCC (FR1) * NR-U PCC * NR-U SCC, with NR-U PCC * NR-U PSCC, with E-UTRAN PCC (FDD,TDD) * NR-U SCC, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) | A.9, A.10, A.11 | II |  | | [10.1.33] | Absolute and relative accuracies for L1-RSRP on:   * NR-U SCC, with NR PCC (FR1) * NR-U PCC * NR-U SCC, with NR-U PCC * NR-U PSCC, with E-UTRAN PCC (FDD,TDD) * NR-U SCC, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) | A.9, A.10, A.11 | II |  | | [10.1.34.1] | Intra-frequency RSSI on:   * NR-U SCC, with NR PCC (FR1) * NR-U PCC * NR-U SCC, with NR-U PCC * NR-U PSCC, with E-UTRAN PCC (FDD,TDD) * NR-U SCC, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) | A.9, A.10, A.11 | II |  | | [10.1.35.1] | Intra-frequency CO on:   * NR-U SCC, with NR PCC (FR1) * NR-U PCC * NR-U SCC, with NR-U PCC * NR-U PSCC, with E-UTRAN PCC (FDD,TDD) * NR-U SCC, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) | A.9, A.10, A.11 | II |  | | Accuracy for  NR-U  inter-frequency  measurements  (SS-RSRP,  SS-RSRQ,  SS-SINR,  SFTD, RSSI,  CO) | [10.1.28] | Inter-frequency absolute and relative accuracies for SS-RSRP on:   * NR-U neighbor, with NR PCC (FR1) * NR-U neighbor, with NR-U PCC * NR-U neighbor, with NR-U PSCC, with E-UTRAN PCC (FDD,TDD) | A.9, A.10, A.11 | I |  | | [10.1.30] | Inter-frequency absolute and relative accuracies for SS-RSRQ on:   * NR-U neighbor, with NR PCC (FR1) * NR-U neighbor, with NR-U PCC * NR-U neighbor, with NR-U PSCC, with E-UTRAN PCC (FDD,TDD) | A.9, A.10, A.11 | II |  | | [10.1.32] | Inter-frequency absolute and relative accuracies for SS-SINR on:   * NR-U neighbor, with NR PCC (FR1) * NR-U neighbor, with NR-U PCC * NR-U neighbor, with NR-U PSCC, with E-UTRAN PCC (FDD,TDD) * NR (FR1) inter-frequency, with NR-U PCC * NR (FR1) inter-frequency, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) | A.9, A.10, A.11 | II |  | | [10.1.34.2] | Inter-frequency RSSI on:   * NR-U neighbor, with NR PCC (FR1) * NR-U neighbor, with NR-U PCC * NR-U neighbor, with NR-U PSCC, with E-UTRAN PCC (FDD,TDD) | A.9, A.10, A.11 | II |  | | [10.1.35.2] | Inter-frequency CO on:   * NR-U neighbor, with NR PCC (FR1) * NR-U neighbor, with NR-U PCC * NR-U neighbor, with NR-U PSCC, with E-UTRAN PCC (FDD,TDD) | A.9, A.10, A.11 | II |  | | Accuracy for  inter-RAT  measurements  (SFTD,  E-UTRA-NR-U  SS-RSRP/  SS-RSRQ/  SS-SINR,  NR-U-E-UTRA  RSRP/RSRQ) | TS 36.133 | Inter-RAT SFTD between:   * E-UTRAN PCell (FDD,TDD) and NR-U neighbor   NOTE: under the condition of stationary paths | A.12 | I | Ericsson | | 10.2.2, 10.2.3 | E-UTRA RSRP/RSRQ (needed for HO) with:   * NR-U PCC * NR-U PSCC | A.11 | II |  | | TS 36.133 | E-UTRA-NR-U SS-RSRP/SS-RSRQ/SS-SINR:   * On NR-U neighbor, with E-UTRA (FDD,TDD) PCC * On NR-U neighbor, with E-UTRA (FDD,TDD) PCC and NR-U PSCC | A.12 | II |  |   ***Proposal 2****: Legacy test cases are to be specified for SA NR-U, even if the requirements are the same as for legacy NR*  *This applies at least for UE not supporting legacy NR.*  *FFS: for UE supporting legacy NR and SA NR-U.*  ***Proposal 3****: Time plan for developing NR-U test cases:*  *RAN4#97-e (Nov 2020):*  *Agree on high-level list for test cases, work split, and specification structure*  *RAN4#98-e (Jan 2021):*  *Discuss and agree on basic common configurations and configuration details at least for Phase I test cases*  *RAN4#98-bis-e (April 2021):Provide first drafts for Phase I test cases*  *Agree on common configurations and configuration details for Phase II test cases*  *RAN4#99-e (May 2021):*  *Provide final CRs for Phase I test cases.*  *Provide first drafts for Phase II test cases.*  *RAN4#100(August 2021):*  *Provide final CRs for Phase II test cases.* |
| [**R4-2014872**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014872.zip) | MediaTek | ***Proposal 1:*** *Regarding cell reselection and handover, new TCs are not needed if the target cell is not in CCA.*  ***Proposal 2:*** *Regarding random access, new dedicated TCs are not necessary.*  ***Proposal 3:*** *Regarding interruption, new TCs are not necessary except for the scenario would have multiple interruption windows, e.g. SCell activation/deactivation and PCell addition/release.*  ***Proposal 4:*** *Regarding active BWP switch delay, new TCs are not necessary, but new TCs are needed for BWP switch delay on consistent UL LBT recovery.*  ***Proposal 5:*** *Regarding RSSI, FFS the TCs when CSSF for RSSI is concluded.*  ***Proposal 6:*** *Regarding measurements procedure and accuracy requirements, new TCs are not needed if the target MO is not in CCA.*  ***Proposal 7:*** *Regarding SS-RSRQ/SS-SINR, the new TCs are not necessary. The UE behavior in CCA can be covered by the tests for SS-RSRP with CCA.*  ***Proposal 8:*** *Regarding UE timing, the new TCs are not necessary for MRTD, MTTD, TA.*  ***Proposal 9:*** *For the RRM test cases for UE transmit timing based on a* reference *cell on a carrier frequency subject to CCA, a configuration of activated Scell shall be provided with the same timing as the reference cell. As the test requirement, UE transmit timing offset should stay within NTA + NTA\_offset) ×Tc ± Te of the first detected path of DL SS or UE shall not transmit any uplink signal.* |
| [**R4-2015390**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015390.zip) | Nokia | 1. The NR-U core requirements that were different from NR core requirements were captured in a new clause, added immediately bellow the respective NR core requirements, with the same clause number, with the addition of the prefix A. 2. Adopt in NR-U RRM test cases, the same specification structure as in the NR-U Core requirements: include the NR-U RRM test cases immediately below the corresponding NR RRM test cases and add the suffix A to the clause number. 3. RAN4 has agreed to define different test cases when LBE or FBE are used. However, for a UE supporting both operation modes, the number of required test cases would be doubled. 4. RAN4 to design different test cases covering LBE and FBE channel access. 5. To minimize the number of test cases to be performed by UEs that support both LBE and FBE, for each requirement, the test equipment should select with equal probability the mode to be used in this test cases (FBE or LBE). 6. Core requirements were modified to take into account LBT failure during procedures. 7. Additionally, new core requirements were created, such as: UL BWP switch due to consistent UL CCA failure and RSSI / CO measurement requirements. 8. RAN4 to define test cases for all core requirements that were changed or created during the NR-U RRM core work. 9. RAN4 to consider the tests defined in Table 1 as a baseline for the NR-U RRM test cases definition in Rel-16.   Table 1 – Test cases needed to cover the core requirements introduced for NR-U in TS 38.133   |  |  |  |  |  | | --- | --- | --- | --- | --- | | Clauses with affected core requirements | | Needed test cases and comments | Corresponding NR tests | | | EN-DC | SA | | 4.2A | Cell Re-selection when subject to CCA | Cell reselection to intra-frequency NR with CCA  Cell reselection to inter-frequency NR with CCA  LBE and FBE |  | A.6.1.1.1  A.6.1.1.2 | | 6.1B | Handover when CCA is used | Intra-frequency handover to NR when target cell is subject to CCA  Inter-frequency handover to NR when target cell is subject to CCA  Known and unknown target cells  LBE and FBE |  | A.6.3.1.1  A.6.3.1.2  A.6.3.1.3 | | 6.2.1A | RRC Re-restablishment with CCA | Intra-frequency RRC Re-establishment when subject to CCA,  Inter-frequency RRC Re-establishment when subjet to CCA  with and without serving cell timing  LBE and FBE |  | A.6.3.2.1.1  A.6.3.2.1.2  A.6.3.2.1.3 | | 6.2.2A | Random access | Depends on RAN4 decision on the random access requirements. In our view, we need the test cases because of the possibility of UL CCA failure for sending the PRACH preamble in 4-step RA type, or for sending msgA in 2-step RA type. | A.4.3.2.2.1  A.4.3.2.2.2  A.4.3.2.2.3 [6]  A.4.3.2.2.4 [6] | A.6.3.2.2.1  A.6.3.2.2.2  A.6.3.2.2.3 [6]  A.6.3.2.2.4 [6] | | 6.2.3A | RRC connection release with redirection with CCA | RRC connection release with redirection with CCA  LBE and FBE |  | A.6.3.2.3.1  A.6.3.2.3.2 | | 7.1.2 | UE transmit timing | NR UE transmit timing  PCell, SCell and PSCell as reference timing cell  LBE and FBE | A.4.4.1.1 | A.6.4.1.1 | | 8.1A | Radio Link Monitoring with CCA on target frequency | RLM Out-of-sync with CCA with side conditions (≥-7 dB and <-7 dB)  RLM In-sync with CCA  Only for SSB-based RLM  PSCell and PCell  DRX and non-DRX modes  LBE and FBE | A.4.5.1.1  A.4.5.1.2  A.4.5.1.3  A.4.5.1.4 | A.6.5.1.1  A.6.5.1.2  A.6.5.1.3  A.6.5.1.4 | | 8.3A | SCell activation and deactivation delay in carriers with CCA | SCell activation and deactivation in carriers with CCA  Known case and unknown  160 ms and 320 ms SCell measurement cycle  DRX and non-DRX  LBE and FBE | A.4.5.3.1  A.4.5.3.2  A.4.5.3.3 | A.6.5.3.1  A.6.5.3.2  A.6.5.3.3 | | 8.5A | Link Recovery procedures when CCA is used on target frequency | SSB-based Beam failure detection recovery test  PCell and PSCell  DRX and non-DRX mode  LBE and FBE | A.4.5.5.1  A.4.5.5.2 | A.6.5.5.1  A.6.5.5.2 | | 8.6.4 | BWP switch delay on Consistent UL LBT recovery | Consistent UL LBT failure based Active BWP switch  PCell and PSCell  Delay and interruption  LBE and FBE | No corresponding clauses. The consistent UL LBT failure based active BWP switch exists only in NR-U | | | 8.10A | Active TCI State switching delay when CCA is used on target frequency | Active TCI state switch  MAC CE and RRC  Known TCI State | Currently, there is no corresponding NR test case in FR1 | | | 9.2A | Intra-frequency measurements | Event triggered intra-frequency measurement  With and without measurement gap  DRX and non-DRX  With and without SSB index reading  LBE and FBE  RSSI & Channel Occupancy – no need for testing LBT | A.4.6.1.1  A.4.6.1.2  A.4.6.1.3  A.4.6.1.4  A.4.6.1.5  A.4.6.1.6  RSSI & CO have no corresponding tests | A.6.6.1.1  A.6.6.1.2  A.6.6.1.3  A.6.6.1.4  A.6.6.1.5  A.6.6.1.6  RSSI & CO have no corresponding tests | | 9.3A | Inter-frequency measurements | Event triggered inter-frequency measurement  With and without measurement gap  DRX and non-DRX  With and without SSB index reading  LBE and FBE  RSSI & Channel Occupancy | A.4.6.2.1  A.4.6.2.2  A.4.6.2.3  A.4.6.2.4  A.4.6.2.5  A.4.6.2.6  RSSI & CO have no corresponding tests | A.6.6.2.1  A.6.6.2.2  A.6.6.2.3  A.6.6.2.4  A.6.6.2.5  A.6.6.2.6  RSSI & CO have no corresponding tests | | 9.5.4A | L1-RSRP measurement requirements | SSB based L1-RSRP measurement  DRX and non-DRX  LBE and FBE | A.4.6.4.1  A.4.6.4.2 | A.6.6.4.1  A.6.6.4.2 |  1. RAN4 to discuss the needed test cases for measurement performance requirements after detailing how to capture the performance requirements in the specification. 2. RAN4 to consider the tests for 36.133 defined in Table 2 as a baseline for the NR-U RRM test cases definition in Rel-16.   Table 2 – Test cases needed to cover the core requirements introduced for NR-U in TS 36.133   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | Clauses with affected core requirements | | | Needed test cases and comments | | Corresponding NR Test cases: | | | 4.2.2.5.7 | | Cell re-selection measurements of NR cells subject to CCA | Cell reselection  LBE and FBE | | A.8.2.1.1 | | | 5.3.4A | | E-UTRAN - NR FR1 Handover to target cell using CCA | Inter-RAT handover to NR when target cell is subject to CCA  LBE and FBE | | A.8.3.1.1 | | | 6.3.2.5 | | RRC connection release with redirection to NR carrier subject to CCA | Should be tested | | * There is no corresponding NR test case. | | | 7.31A | | Addition and Release Delay of NR PSCell Operating with CCA for E-UTRA - NR Dual Connectivity | RRC connection release with redirection  LBE and FBE | | A.4.5.7.1 | | | 8.1.2.4.21A  8.1.2.4.22A | | E-UTRAN FDD – NR measurements when CCA is used  E-UTRAN TDD – NR measurements when CCA is used | NR Inter-RAT event triggered reporting tests with CCA  With/without SSB time index detection  DRX and non-DRX  LBE and FBE  RSSI measurements  Channel Occupancy measurements  Corresponding NR test cases: | | A.8.4.2.1,  A.8.4.2.2,  A.8.4.2.3,  A.8.4.2.4 | | | 8.1.2.4.25.2a | | SFTD Measurement delay with CCA on target frequency | E-UTRA – NR Inter-RAT SFTD Measurement Delay with CCA  DRX and non-DRX  LBE and FBE  Corresponding NR test cases: & | | A.8.4.1.1 | | | 8.17.2.2.a | | SFTD Measurement requirements with CCA on target frequency | A.8.4.1.2 | | | 8.17.4A | | E-UTRA Inter-RAT NR Measurements when CCA is used when Configured with E-UTRA-NR Dual Connectivity Operation | The requirements are tested in clause 8.1.2.4.21 – 22, we can take the same approach in NR-U. | | No corresponding NR test case | | |
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## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic 3-1: Specification Structure

Issues to be treated in this sub-topic:

Issue 3-1-1: Specification Structure for test cases

Issue 3-1-2: Specification structure for common configuration parameters

#### Issue 3-1-1: Specification Structure for test cases

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| **Issue 3-1-1: Specification structure for test cases**   * Proposals   + Option 1 (Ericsson, R4-2016415) Create in TS 38.133 the following new top-level sections for NR-test cases:     - A.9 NR standalone tests with SCell under CCA and PCell in FR1     - A.10 EN-DC tests with NR PSCell under CCA     - A.11 NR-U standalone tests with NR PCell under CCA (note: including also NR/E-UTRA measurements and including re-selection in IDLE and HO from NR-U to NR-U/NR/E-UTRA cells and from NR-U/NR to NR-U cells)     - A.12 E-UTRA standalone tests with NR-U cells       * Inter-RAT E-UTRA–NR-U cell re-selection with NR-U target cell       * Inter-RAT E-UTRA–NR-U HO with NR-U target cell       * Inter-RAT E-UTRA–NR-U measurements       * Inter-RAT SFTD with NR-U neighbor cell   + Option 2 (Nokia, R4-2015391) Adopt in NR-U RRM test cases, the same specification structure as in the NR-U Core requirements: include the NR-U RRM test cases immediately below the corresponding NR RRM test cases and add the suffix A to the clause number. Capture the test cases related to requirements in TS 36.133 in the same specification. * Recommended WF   + - **Discuss the proposals in the first round.**   ***Agreement from the GTW session on November 3rd, 2020.***  Agreement:   * + Create in TS 38.133 the following new top-level sections for NR-test cases:     - A.9 NR standalone tests with SCell under CCA and PCell in FR1     - A.10 EN-DC tests with NR PSCell under CCA     - A.11 NR-U standalone tests with NR PCell under CCA (note: including also NR/E-UTRA measurements and including re-selection in IDLE and HO from NR-U to NR-U/NR/E-UTRA cells and from NR-U/NR to NR-U cells)     - A.12 E-UTRA standalone tests with NR-U cells       * Inter-RAT E-UTRA–NR-U cell re-selection with NR-U target cell       * Inter-RAT E-UTRA–NR-U HO with NR-U target cell       * Inter-RAT E-UTRA–NR-U measurements       * Inter-RAT SFTD with NR-U neighbor cell |
| ZTE: We slightly prefer Option 2 but can also agree on Option 1. |
| MTK: We slightly prefer Option 2 but can also agree on Option 1. |
| Ericsson: support option 1. A drawback with option 2, the test cases will get spread all over, it will not be straightforward to quickly find them all of them. |
| Apple: fine with option 2 |

#### Issue 3-1-2: Specification structure for common configuration parameters

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| **Issue 3-1-2: Specification structure for common Configuration Parameters**   * Proposals   + Option 1: Develop new sections for common test parameters in NR-U RRM test cases according to the table.  |  |  | | --- | --- | | **New section** | **Title** | | A.3.1.\* | … under CCA | | A.3.2.3 | Generic OFDMA Channel Noise Generator (OCNG) under CCA | | A.3.7B | EN-DC test setup with PSCell under CCA | | A..3.8.4 | PRACH configuration under CCA | | A.3.10A | SSB configurations under CCA | | A.3.16A | TCI state configurations under CCA | | A.3.19 | Discovery Burst Transmission Window configuration under CCA | | A.3.20 | Signal transmission model under CCA | | NOTE: “\*” denotes different relevant sub sections | |  * + - (Ericsson, R4-2016415) * Recommended WF   + - **Discuss the proposal in the first round.** |
| ZTE: Can agree on Option 1. |
| Ericsson: support option 1 |
| Qualcomm: Option 1 looks fine. |
| Nokia: Option 1 is fine. |

### Sub-topic 3-2: RRM tests scope and applicability rules

Issues to be treated in this sub-topic:

Issue 3-2-1: RRM tests scope – general principle to define a test case list

Issue 3-2-2: RRM tests scope – legacy test cases for SA NR-U

Issue 3-2-3: RRM tests scope – NR-U scenarios to be covered by NR-U test cases

Issue 3-2-4: Applicability rules

#### Issue 3-2-1: RRM tests scope – general principle to define a test case list

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| **Issue 3-2-1: RRM tests scope – general principle to define a test case list**   * Proposals   + Proposal 1 (Nokia, Nokia Shanghai Bell, R4-2015391): RAN4 to define test cases for all core requirements that were changed or created during the NR-U RRM core work. * Recommended WF   **Is Proposal 1 agreeable?** |
| MTK: Disagree with Proposal 1. We prefer to discuss it case by case as listed in issue 3-3-1, to reduce the number of tests. |
| Ericsson: not only the newly introduced/changed requirements need to be tested; better to focus on the list on case-by-case basis. |
| Apple: fine with the principle, but how to further down select needs to be done case by case. |
| Qualcomm: Need to discuss on case by case basis. |
| Nokia: the intention of the proposal was not to exclude other test cases, but to ensure that at least the new core requirements (or ones that were modified during the WI) would be tested. But it is fine to take this discussion on case-by-case basis. |

#### Issue 3-2-2: RRM tests scope – general principle to define a test case list

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| **Issue 3-2-2: RRM tests scope – legacy test cases for SA NR-U**   * Proposals   + Proposal 1 (Ericsson, R4-2016416): Legacy test cases are to be specified for SA NR-U, even if the requirements are the same as for legacy NR     - This applies at least for UE not supporting legacy NR.     - FFS: for UE supporting legacy NR and SA NR-U. * Recommended WF   **Discuss if proposal 1 agreeable. Should RAN4 specify test cases for SA NR-U, even for requirements that are the same as for legacy NR?** |
| ZTE: In our view the test cases shall be specified for all UEs claiming to support NR-U in SA mode. We can further discuss it if companies have concerns on this issue. |
| MTK: Fine with Proposal 1. For the UE supporting legacy NR and SA NR-U, the Legacy test cases should not be tested twice, to avoid to-many tests. UE should be allowed to pass test of only one scenario. |
| Ericsson: support option 1 |
| Apple: generally fine but do we have a case that UE not support legacy NR SA but it supports NR-U? need more discussion on this applicability. |
| Huawei: Fine with proposal 1, but we have similar concern as Apple. If there is a case that UE only support NR-U SA, e.g. test cases for HO from NR-U to NR is no needed. Another high level principle question we believe related to many test cases, if a UE could pass the test for NR-U (e.g. HO to NR-U), is the test for legacy NR (HO to NR) is still needed? |
| Qualcomm: Agree with other companies that not all of the legacy test cases may apply for a UE supporting NR-U SA. Furthermore, for a UE supporting legacy NR along with NR-U, the legacy test cases should not be tested multiple times. |
| Nokia: we can take this discussion on the case by case as well, as commented by others in the GTW session. For the requirements that are the same between NR & NR-U, we would prefer to discuss if there is a more efficient way to define how an NR-U only capable UE will need to be tested. For this part, we would like to come back in the next meeting after discussing internally if there is another option than repeating all NR test cases to reduce the workload (for example, by creating new configurations for tests that exist already and for which the requirements are the same).  Answering Huawei’s comment, we do think the test would be needed, if the requirements are different as in the example from HO to NR-U and HO to NR. When the requirement is the same, we believe that it should not be tested twice. |

#### Issue 3-2-3: RRM tests scope – NR-U scenarios to be covered by NR-U test cases

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| **Issue 3-2-3: RRM tests scope – NR-U scenarios to be covered by NR-U test cases**   * Proposals   + Proposal 1 (Ericsson, R4;2016415): RAN4 will develop test cases for all scenarios applicable for a given requirement.   + (See also issue 3-2-2 on applicability rules for UE capable of multiple scenarios) * Recommended WF   Discuss if proposal 1 agreeable. |
| ZTE: We think that proposal 1 can be adopted as the principle. |
| MTK: Fine with Proposal 1, but UE shall pass test in only one scenario out of all scenarios to avoid too-many tests. |
| Ericsson: support option 1. |
| Apple: generally fine but still need to check case by case, because some of requirement only applies for certain scenarios, e.g. re-establishment test for scenario C (NR-U SA) is sufficient. |
| Qualcomm: We prefer to do this on a case to case basis. |
| Nokia: The proposal is fine in general at least for new requirements, but we prefer we take this case by case |

#### Issue 3-2-4: Applicability rules

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| **Issue 3-2-2: Applicability rules**   * Proposals   + Proposal 1 (Ericsson, R4-2016416):     - RAN4 will discuss applicability rules when test cases have sufficiently progressed, e.g.:       * FFS: for a UE capable of multiple scenarios, the UE shall pass the test to verify the same requirements on the same type of cell (e.g. UE timing accuracy) in only one scenario.   + Proposal 2 (Nokia, Nokia Shanghai Bell, R4-2015391):     - To minimize the number of test cases to be performed by UEs that support both LBE and FBE, for each requirement, the test equipment should select with equal probability the mode to be used in this test cases (FBE or LBE). * Recommended WF   + - * **Discuss both proposals.** |
| ZTE: We can postpone this issue to later discussions. |
| MTK: Fine with Proposal 1 and the FFS.  On proposal 2, we think if the UE can pass LBE tests, than it is required to pass FBE test, assuming LBE tests are more challenging. |
| Ericsson: Support Proposal 1. Too early to discuss any further details until we progressed with the test cases. |
| Apple: fine with proposal 1, and proposal 2 needs more discussion, because we may not need to configure FBE or LBE in all of the test cases. |
| Huawei: We have concerns on proposal 2 on the selection with probability. The applicability rules should be discussed considered all cases for LBE and FBE. |
| Qualcomm: Agree with proposal 1. |
| Nokia: we are fine with proposal 1, and proposal 2 could be kept as FFS: “For UEs supporting both FBE and LBE”, so that in the next meeting other companies bring their views. |

### Sub-topic 3-3: Test case list

The NR-U work item created/modified a significant number of requirements that now need to be tested. In this sub-topic these tests are discussed. The purpose of Issue 3-3-1 is to collect the general views on which test cases are needed or not needed in NR-U, to determine the scope of the test cases discussions needed in the next meetings.

The other issues in this sub-topic create a space for companies to provide their views, regarding the exact proposals in different TDocs.

Issues discussed in this sub-topic:

Issue 3-3-1: Test case list overview

Issue 3-3-2: Cell reselection tests

Issue 3-3-3: Handover (delay and interruptions) test cases

Issue 3-3-4: RRC Re-establishment test cases

Issue 3-3-5: Random access

Issue 3-3-6: RRC Connection Release with redirection

Issue 3-3-7: Timing

Issue 3-3-8: BWP switching delay and interruptions

Issue 3-3-9: Radio Link Monitoring

Issue 3-3-10: Beam management

Issue 3-3-11: SCell activation/ deactivation delay

Issue 3-3-12: PSCell addition/release delay

Issue 3-3-13: Active TCI State Switching delay

Issue 3-3-14: Interruptions

Issue 3-3-15: Intra-frequency measurement procedure

Issue 3-3-16: Inter-frequency measurement procedure

Issue 3-3-17: Inter-RAT measurement procedure

Issue 3-3-18: Measurement accuracy tests

#### Issue 3-3-1: Test case list overview

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| **Issue 3-3-1: Test case list overview**  **Background:**  **Documents** [R4-2014872](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014872.zip)**,** [R4-2015390](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015390.zip)**,** [R4-2016416](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016416.zip) **and** [R4-2016567](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016567.zip) **proposed different test cases. In order to assess the views of each company, in this issue we present the list based on document** [R4-2016416](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016416.zip)**, which had more test cases than the other documents. The purpose of this issue is to assess whether the company supports or not the test case.**   * Recommended WF   + - **Companies are encouraged to fill in the table below with their company name (preferably abbreviation), in the columns ”Needed” or ”Not Needed”. The specific test cases, and space for discussing them is given in the issues below.** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Group of requirements** | **Test cases** | **Requirements section** | **Needed** | **Not Needed** |
| RRC\_IDLE, cell re-selection | NR-U/NR(FR1) -> NR-U | 4.2A | ZTE, MTK, Ericsson, Qualcomm |  |
| NR-U -> NR(FR1) | ZTE, Ericsson, Nokia Qualcomm | MTK |
| NR-U - > E-UTRAN (FDD,TDD) | Ericsson | MTK |
| E-UTRAN (FDD,TDD) -> NR-U | TS 36.133 | Ericsson, Nokia | MTK |
| RRC\_INACTIVE, cell re-selection | Not needed | 5.1A | Ericsson: agree to not test |  |
| HO (delay and interruptions) | NR-U/NR(FR1) -> NR-U | 6.1B | ZTE MTK, Ericsson, Nokia Qualcomm |  |
| NR-U -> NR(FR1) | 6.1.1.2 | ZTE, Ericsson | MTK |
| NR-U - > E-UTRAN (FDD,TDD) | 6.1.2.1 | Ericsson | MTK |
| E-UTRAN (FDD,TDD) -> NR-U | TS 36.133 | MTK, Ericsson, Nokia |  |
| RRC Re-establishment | NR-U/NR(FR1) -> NR-U | 6.2.1A | ZTE MTK, Ericsson, Nokia Qualcomm |  |
| Random access | (*requirements not available yet, being discussed in thread 205*) | 6.2.2A [1] |  |  |
| Contention-based and non-contention based RA: | to be discussed in the 2nd round. |  |
|         to NR-U PCell |  |  |
|         to NR-U PSCell |  |  |
| RRC Connection Release with Redirection |         NR-U/NR(FR1) -> NR-U | 6.2.3.2.3 | ZTE MTK, Ericsson, Nokia Qualcomm |  |
| Timing (transmit timing and timing advance) |         NR-U PCell | 7.1, 7.3 | ZTE MTK, Ericsson, Nokia |  |
|         NR-U PSCell | ZTE MTK, Ericsson, Nokia |  |
| BWP switching delay and interruptions | DCI/timer/RRC-based BWP switching on NR-U SCell, with: | 8.6 |  |  |
|         NR PCC (PCC) | Ericsson |  |
|         NR-U PCC | ZTE, Ericsson |  |
|         NR-U PSCC and E-UTRAN PCC (FDD, TDD) | Ericsson |  |
| NOTE: verify BWP switching under consistent UL failure. Legacy BWP is to be verified only in SA. | Ericsson (agree with the note), Nokia) |  |
| RLM (in-syn and out-of-sync) |         On NR-U PCC | 8.1A | ZTE MTK, Ericsson, Nokia Qualcomm |  |
|         On NR-U PSCC, with E-UTRAN PCC (FDD,TDD) | MTK, Ericsson, Nokia Qualcomm |  |
| BM |         On NR-U PCC | 8.5A | ZTE MTK, Ericsson, Nokia Qualcomm |  |
|         On NR-U PSCC, with E-UTRAN PCC (FDD,TDD) | MTK, Ericsson Nokia, Qualcomm |  |
| SCell activation/deactivation delay | For known and unknown target NR-U SCell, with: | 8.3A |  |  |
|         NR PCC (FR1) | ZTE MTK, Ericsson, Nokia Qualcomm |  |
|         NR-U PCC | ZTE MTK, Ericsson, Nokia Qualcomm |  |
|         NR-U PSCC and E-UTRAN PCC (FDD, TDD) | MTK, Ericsson, Nokia Qualcomm |  |
| PSCell addition/release delay | For known and unknown target NR-U PSCell, with: | TS 36.133 |  |  |
|         E-UTRA PCC | MTK, Ericsson, Nokia Qualcomm |  |
| Active TCI state switching delay | For known and unknown target TCI state in NR-U, on: | 8.10A |  |  |
|         NR-U PCC | ZTE, Ericsson, Nokia | MTK |
|         NR-U SCC, with NR PCC (FR1) | ZTE, Ericsson, Nokia | MTK |
|         NR-U PSCC, with E-UTRAN PCC (FDD, TDD) | Ericsson, Nokia | MTK |
| Interruptions | Due to NR-U SCell addition/release, with: | 8.2.1, 8.2.2 |  |  |
|         NR PCC (FR1) | ZTE, Ericsson | MTK |
|         NR-U PCC | ZTE, Ericsson | MTK |
|         NR-U PSCC and E-UTRAN PCC (FDD,TDD) | Ericsson | MTK |
|  | Due to NR-U SCell activation/deactivation, with: | 8.2.1, 8.2.2 |  |  |
|         NR PCC (FR1) | ZTE MTK, Ericsson, Nokia |  |
|         NR-U PCC | ZTE MTK, Ericsson, Nokia |  |
|         NR-U PSCC and E-UTRAN PCC (FDD,TDD) | MTK, Ericsson, Nokia |  |
|  | During measurements no deactivated NR-U SCell, with: | 8.2.1, 8.2.2 |  |  |
|         NR PCC (FR1) | ZTE, Ericsson | MTK |
|         NR-U PCC | ZTE, Ericsson | MTK |
|         NR-U PSCC and E-UTRAN PCC (FDD,TDD) | Ericsson | MTK |
|  | Due to inter-RAT SFTD measurements between: | TS 36.133 |  |  |
|         NR-U PCell and E-UTRAN PCell (FDD,TDD) | Ericsson |  |
|  | Due to NR-U PSCell addition/release, with: | TS 36.133 |  |  |
|         E-UTRA PCell | MTK, Ericsson, Nokia |  |
| Intra-frequency measurement procedure (SS-RSRP, SS-RSRQ, SS-SINR, L1-RSRP, RSSI, CO) | Intra-frequency SS-RSRP, SS-RSRQ, SS-SINR measurements on: | 9.2A.5, 9.2A.6 |  |  |
|         NR-U SCC, with NR PCC (FR1) | ZTE  MTK, Ericsson , Nokia, Qualcomm |  |
|         NR-U PCC | ZTE  MTK, Ericsson, Nokia Qualcomm |  |
|         NR-U SCC, with NR-U PCC | ZTE  MTK, Ericsson, Nokia Qualcomm |  |
|         NR-U PSCC, with E-UTRAN PCC (FDD,TDD) | MTK, Ericsson, Nokia |  |
|         NR-U SCC measurements, with E-UTRAN PCC (FDD,TDD) and NR-U PSCC | MTK, Ericsson, Nokia Qualcomm |  |
| L1-RSRP measurements on: | [9.5.4A] |  |  |
|         NR-U SCC, with NR PCC (FR1) | ZTE  MTK, Ericsson, Nokia |  |
|         NR-U PCC | ZTE  MTK, Ericsson, Nokia |  |
|         NR-U SCC, with NR-U PCC | ZTE  MTK, Ericsson, Nokia |  |
|         NR-U PSCC, with E-UTRAN PCC (FDD,TDD) | MTK, Ericsson, Nokia |  |
|         NR-U SCC measurements, with E-UTRAN PCC (FDD,TDD) and NR-U PSCC | MTK, Ericsson, Nokia |  |
| Intra-frequency RSSI measurements on: | 9.2A.7.1 |  |  |
|         NR-U SCC, with NR PCC (FR1) | ZTE  MTK, Ericssonv, Nokia |  |
|         NR-U PCC | ZTE  MTK, Ericsson, Nokia |  |
|         NR-U SCC, with NR-U PCC | ZTE  MTK, Ericsson, Nokia |  |
|         NR-U PSCC, with E-UTRAN PCC (FDD,TDD) | ZTE  MTK, Ericsson, Nokia |  |
|         NR-U SCC measurements, with E-UTRAN PCC (FDD,TDD) and NR-U PSCC | ZTE  MTK, Ericsson, Nokia |  |
| Intra-frequency CO measurements on: | 9.2A.7.2 |  |  |
|         NR-U SCC, with NR PCC (FR1) | ZTE  MTK, Ericsson, Nokia |  |
|         NR-U PCC | ZTE  MTK, Ericsson, Nokia |  |
|         NR-U SCC, with NR-U PCC | ZTE  MTK, Ericsson, Nokia |  |
|         NR-U PSCC, with E-UTRAN PCC (FDD,TDD) | ZTE  MTK, Ericsson, Nokia |  |
|         NR-U SCC measurements, with E-UTRAN PCC (FDD,TDD) and NR-U PSCC | ZTE  MTK, Ericsson, Nokia |  |
| Inter-frequency measurement procedure (SS-RSRP, SS-RSRQ, SS-SINR, SFTD, RSSI, CO) | Inter-frequency SS-RSRP, SS-RSRQ, SS\_SINR measurements on: | 9.3A.4, 9.3A.5 |  |  |
|         NR-U inter-frequency, with NR PCC (FR1) | ZTE  MTK, Ericsson, Nokia Qualcomm |  |
|         NR-U inter-frequency, with NR-U PCC | ZTE  MTK, Ericsson, Nokia Qualcomm |  |
|         NR-U inter-frequency, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) | MTK, Ericsson, Nokia |  |
|         NR (FR1) inter-frequency, with NR-U PCC | ZTE  MTK, Ericsson, Nokia Qualcomm |  |
|         NR (FR1) inter-frequency, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) | MTK, Ericsson, Nokia |  |
| Inter-frequency RSSI measurements on: | 9.3A.8 |  |  |
|         NR-U inter-frequency, with NR PCC (FR1) | ZTE  MTK, Ericsson, Nokia |  |
|         NR-U inter-frequency, with NR-U PCC | ZTE  MTK, Ericsson, Nokia |  |
|         NR-U inter-frequency, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) | MTK, Ericsson, Nokia |  |
| Inter-frequency CO measurements on: | 9.3A.9 |  |  |
|         NR-U inter-frequency, with NR PCC (FR1) | ZTE  MTK, Ericsson, Nokia |  |
|         NR-U inter-frequency, with NR-U PCC | ZTE  MTK, Ericsson, Nokia |  |
|         NR-U inter-frequency, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) | MTK, Ericsson, Nokia |  |
| Inter-RAT measurement procedure (SFTD, E-UTRA-NR-U SS-RSRP/SS-RSRQ/SS-SINR, NR-U-E-UTRA RSRP/RSRQ) | Inter-RAT SFTD between: | TS 36.133 |  |  |
|         E-UTRAN PCell (FDD,TDD) and NR-U neighbor | ZTE  MTK, Ericsson, Nokia |  |
| NOTE: under the condition of stationary paths | Ericsson (agree with the note) |  |
| NR-U-E-UTRA RSRP/RSRQ (needed for HO): | 9.4.2, 9.4.3 |  |  |
|         On E-UTRA (FDD,TDD), with NR-U PCC | ZTE, Ericsson | MTK |
|         On E-UTRA (FDD,TDD), with NR-U PSCC | ZTE, Ericsson | MTK |
| E-UTRA-NR-U SS-RSRP/SS-RSRQ/SS-SINR: | TS 36.133 |  |  |
|         On NR-U neighbor, with E-UTRA (FDD,TDD) PCC | ZTE  MTK, Ericsson, Nokia |  |
|         On NR-U neighbor, with E-UTRA (FDD,TDD) PCC and NR-U PSCC | MTK, Ericsson, Nokia |  |
| Accuracy for NR-U intra-frequency measurements (SS-RSRP, SS-RSRQ, SS-SINR, L1-RSRP, RSSI, CO) | Intra-frequency absolute and relative accuracies for SS-RSRP on: | [10.1.27] |  |  |
|         NR-U SCC, with NR PCC (FR1) | ZTE  MTK, Ericsson, Nokia |  |
|         NR-U PCC | ZTE  MTK, Ericsson, Nokia |  |
|         NR-U SCC, with NR-U PCC | ZTE  MTK, Ericsson, Nokia |  |
|         NR-U PSCC, with E-UTRAN PCC (FDD,TDD) | MTK, Ericsson, Nokia |  |
|         NR-U SCC, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) | MTK, Ericsson, Nokia |  |
| Intra-frequency absolute accuracies for SS-RSRQ on: | [10.1.29] |  |  |
|         NR-U SCC, with NR PCC (FR1) | ZTE  MTK, Ericsson, Nokia |  |
|         NR-U PCC | ZTE  MTK, Ericsson, Nokia |  |
|         NR-U SCC, with NR-U PCC | ZTE  MTK, Ericsson, Nokia |  |
|         NR-U PSCC, with E-UTRAN PCC (FDD,TDD) | MTK, Ericsson, Nokia |  |
|         NR-U SCC, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) | MTK, Ericsson, Nokia |  |
| Intra-frequency absolute accuracies for SS-SINR on: | [10.1.31] |  |  |
|         NR-U SCC, with NR PCC (FR1) | ZTE  MTK, Ericsson, Nokia |  |
|         NR-U PCC | ZTE  MTK, Ericsson, Nokia |  |
|         NR-U SCC, with NR-U PCC | ZTE  MTK, Ericsson, Nokia |  |
|         NR-U PSCC, with E-UTRAN PCC (FDD,TDD) | MTK, Ericsson, Nokia |  |
|         NR-U SCC, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) | MTK, Ericsson, Nokia |  |
| Absolute and relative accuracies for L1-RSRP on: | [10.1.33] |  |  |
|         NR-U SCC, with NR PCC (FR1) | ZTE  MTK, Ericsson, Nokia |  |
|         NR-U PCC | ZTE  MTK, Ericsson, Nokia |  |
|         NR-U SCC, with NR-U PCC | ZTE  MTK, Ericsson, Nokia |  |
|         NR-U PSCC, with E-UTRAN PCC (FDD,TDD) | MTK, Ericsson, Nokia |  |
|         NR-U SCC, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) | MTK, Ericsson, Nokia |  |
| Intra-frequency RSSI on: | [10.1.34.1] |  |  |
|         NR-U SCC, with NR PCC (FR1) | ZTE  MTK, Ericsson, Nokia |  |
|         NR-U PCC | ZTE  MTK, Ericsson, Nokia |  |
|         NR-U SCC, with NR-U PCC | ZTE  MTK, Ericsson, Nokia |  |
|         NR-U PSCC, with E-UTRAN PCC (FDD,TDD) | ZTE  MTK, Ericsson, Nokia |  |
|         NR-U SCC, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) | ZTE  MTK, Ericsson, Nokia |  |
| Intra-frequency CO on: | [10.1.35.1] |  |  |
|         NR-U SCC, with NR PCC (FR1) | ZTE  MTK, Ericsson, Nokia |  |
|         NR-U PCC | ZTE  MTK, Ericsson, Nokia |  |
|         NR-U SCC, with NR-U PCC | ZTE  MTK, Ericsson, Nokia |  |
|         NR-U PSCC, with E-UTRAN PCC (FDD,TDD) | ZTE  MTK, Ericsson, Nokia |  |
|         NR-U SCC, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) | ZTE  MTK, Ericsson, Nokia |  |
| Accuracy for NR-U inter-frequency measurements (SS-RSRP, SS-RSRQ, SS-SINR, SFTD, RSSI, CO) | Inter-frequency absolute and relative accuracies for SS-RSRP on: | [10.1.28] |  |  |
|         NR-U neighbor, with NR PCC (FR1) | ZTE  MTK, Ericsson, Nokia |  |
|         NR-U neighbor, with NR-U PCC | ZTE  MTK, Ericsson, Nokia |  |
|         NR-U neighbor, with NR-U PSCC, with E-UTRAN PCC (FDD,TDD) | MTK, Ericsson, Nokia |  |
| Inter-frequency absolute and relative accuracies for SS-RSRQ on: | [10.1.30] |  |  |
|         NR-U neighbor, with NR PCC (FR1) | ZTE, Ericsson, Nokia | MTK |
|         NR-U neighbor, with NR-U PCC | ZTE, Ericsson, Nokia | MTK |
|         NR-U neighbor, with NR-U PSCC, with E-UTRAN PCC (FDD,TDD) | Ericsson, Nokia | MTK |
| Inter-frequency absolute and relative accuracies for SS-SINR on: | [10.1.32] |  |  |
|         NR-U neighbor, with NR PCC (FR1) | ZTE, Ericsson, Nokia | MTK |
|         NR-U neighbor, with NR-U PCC | ZTE, Ericsson, Nokia | MTK |
|         NR-U neighbor, with NR-U PSCC, with E-UTRAN PCC (FDD,TDD) | Ericsson, Nokia | MTK |
|         NR (FR1) inter-frequency, with NR-U PCC | ZTE, Ericsson, Nokia | MTK |
|         NR (FR1) inter-frequency, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) | ZTE, Ericsson, Nokia | MTK |
| Inter-frequency RSSI on: | [10.1.34.2] |  |  |
|         NR-U neighbor, with NR PCC (FR1) | ZTE  MTK, Ericsson, Nokia |  |
|         NR-U neighbor, with NR-U PCC | ZTE  MTK, Ericsson, Nokia |  |
|         NR-U neighbor, with NR-U PSCC, with E-UTRAN PCC (FDD,TDD) | ZTE  MTK, Ericsson, Nokia |  |
| Inter-frequency CO on: | [10.1.35.2] |  |  |
|         NR-U neighbor, with NR PCC (FR1) | ZTE  MTK, Ericsson, Nokia |  |
|         NR-U neighbor, with NR-U PCC | ZTE  MTK, Ericsson, Nokia |  |
|         NR-U neighbor, with NR-U PSCC, with E-UTRAN PCC (FDD,TDD) | ZTE  MTK, Ericsson, Nokia |  |
| Accuracy for inter-RAT measurements (SFTD, E-UTRA-NR-U SS-RSRP/SS-RSRQ/SS-SINR, NR-U-E-UTRA RSRP/RSRQ) | Inter-RAT SFTD between: | TS 36.133 |  |  |
|         E-UTRAN PCell (FDD,TDD) and NR-U neighbor | ZTE  MTK, Ericsson, Nokia |  |
| NOTE: under the condition of stationary paths |  |  |
| E-UTRA RSRP/RSRQ (needed for HO) with: | 10.2.2, 10.2.3 |  |  |
|         NR-U PCC | ZTE, Ericsson | MTK |
|         NR-U PSCC | ZTE, Ericsson | MTK |
| E-UTRA-NR-U SS-RSRP/SS-RSRQ/SS-SINR: | TS 36.133 |  |  |
|         On NR-U neighbor, with E-UTRA (FDD,TDD) PCC | ZTE  MTK, Ericsson, Nokia |  |
|         On NR-U neighbor, with E-UTRA (FDD,TDD) PCC and NR-U PSCC | Ericsson, Nokia |  |

#### Issue 3-3-2: Cell reselection tests

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| **Issue 3-3-2: Cell Reselection Tests**   * Proposals   + Proposal 1 (Ericsson, R4-2016416): Cell re-selection test cases:  |  | | --- | | * NR-U/NR(FR1) -> NR-U * NR-U -> NR(FR1) * NR-U - > E-UTRAN (FDD,TDD) | | * E-UTRAN (FDD,TDD) -> NR-U |  * + Proposal 2 (MediaTek, R4-2014872): Intra and inter-frequency cases when CCA is used both on target and serving cells. Regarding cell reselection and handover, new TCs are not needed if the target cell is not in CCA.   + Proposal 3 (Qualcomm, R4-2016567):     - Cell reselection to NR-U Pcell intra-frequency case     - Cell reselection to NR-U Pcell inter-frequency case     - Cell reselection from NR-U Pcell inter-frequency case   + Proposal 4 (Nokia)     - Cell reselection to intra-frequency NR with CCA     - Cell reselection to inter-frequency NR with CCA * Recommended WF   + - **This is the placeholder for eventual comments related to the cell-reselection tests in Issue 3-3-1. From the moderator perspective, the following test cases are not controversial, and could be agreed:**       1. **Cell reselection to FR1 intra-frequency NR when CCA is used on the serving and target cell**       2. **Cell reselection to FR1 inter-frequency NR when CCA is used on the serving and target cell**       3. **Cell reselection from E-UTRAN (FDD, TDD) to FR1 when CCA is used on the target cell**     - **The test cases below can be further discussed.**       1. **Cell reselection from NR-U cell to NR (NR-U -> NR(FR1)**       2. **Cell reselection from NR cell to NR-U (NR-U -> NR(FR1)**       3. **Cell reselection from NR-U cell to E-UTRAN (NR-U - > E-UTRAN (FDD,TDD))** |
| MTK: agree with 1st/2nd /3rd bullets.  Regarding 4/5/6 from NR-U cell, we reckon the CCA behaviour are already covered by the 1st/2nd /3rd bullets, and thus it is not necessary to introduce new test, in order to reduce the number of tests. |
| Ericsson: prefer Proposal 1. Further, for intra-RAT, both intra- and inter-frequency are considered. |
| Huawei: We think the test cases when only the camping Cell is NR-U should also be defined as the requirements are different and it should be tested if UE supports reselection from NR-U to NR/E-UTRA. |
| Nokia: We support the recommended WF. For the other test cases, we would prefer to discuss if there is a more efficient way to define how an NR-U only capable UE will need to be tested for the requirements that are the same as in NR. For this part, we would like to come back in the next meeting after discussing internally if there is another option than repeating all NR test cases to reduce the workload (for example, by creating new configurations for tests that exist already and for which the requirements are the same). |

#### Issue 3-3-3: Handover (delay and interruptions) test cases

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| **Issue 3-3-3: Handover (delay and interruptions) test cases**   * Proposals   + Proposal 1 (Ericsson, R4-2016416): Test cases to be introduced for:     - NR-U/NR(FR1) -> NR-U     - NR-U -> NR(FR1)     - NR-U - > E-UTRAN (FDD,TDD)     - E-UTRAN (FDD,TDD) -> NR-U   + Proposal 2 (MediaTek, R4-2014872):     - Intra-frequency handover from FR1 CCA to FR1 CCA ; known target cell     - Intra-frequency handover from FR1 CCA to FR1 CCA ; unknown target cell     - Inter-frequency handover from FR1 CCA to FR1 CCA ; unknown target cell     - E-UTRAN – NR FR1 CCA     - Not necessary. CCA only has impact on the target cell during handover procedure       1. - SA NR - E-UTRAN       2. - SA NR - E-UTRAN       3. - SA NR - UTRAN FDD   + Proposal 3 (Qualcomm, R4-2016567 and Nokia, R4-2015390):     - Intra-frequency handover from NR-U to NR-U; known target cell     - Intra-frequency handover from NR-U to NR-U; unknown target cell     - Inter-frequency handover from NR-U to NR-U; known target cell     - Inter-frequency handover from NR-U to NR-U; unknown target cell     - Inter-frequency handover from NR to NR-U; known target cell     - Inter-frequency handover from NR to NR-U; unknown target cell * Recommended WF   + - **This is the placeholder for eventual comments related to the handover tests in Issue 3-3-1. From the moderator perspective considering the submitted contributions, the following test cases are not controversial, and could be agreed:**       1. **Intra-frequency handover from NR-U to NR-U; known target cell**       2. **Intra-frequency handover from NR-U to NR-U; unknown target cell**       3. **Inter-frequency handover from NR-U to NR-U; known target cell**       4. **Inter-frequency handover from NR-U to NR-U; unknown target cell**       5. **Inter-frequency handover from NR to NR-U; known target cell**       6. **Inter-frequency handover from NR to NR-U; unknown target cell**       7. **Inter-RAT handover from E-UTRAN FDD / TDD to NR-U**     - **Discuss the other test cases:**  1. **Inter-RAT handover from NR-U to E-UTRAN (FDD, TDD)** 2. **Inter-frequency handover from NR-U to NR; known target cell** 3. **Inter-frequency handover from NR-U to NR; unknown target cell** |
| MTK: Agree with 1, 2, 4, 7.  Regarding 5, 6, the new UE behavior of NR-U HO requirement v.s. the legacy HO requirement is about the LBT failures on the target cell, so 5, 6, can be covered by 3, 4.  Regarding 3, it will be similar to 1. It would be good to pick up just 3 or 4 to test, in order to reduce the number of test. It is also the practice in R15 tests. (A.6.3.1)  A.6.3.1.1 Intra-frequency handover from FR1 to FR1; known target cell 664  A.6.3.1.2 Intra-frequency handover from FR1 to FR1; unknown target cell 666  A.6.3.1.3 Inter-frequency handover from FR1 to FR1; unknown target cell 668  A.6.3.1.4 SA NR - E-UTRAN handover 670  A.6.3.1.5 SA NR - E-UTRAN handover with unknown target cell 674  Regarding 8,9,10, we reckon it is not necessary to add new tests, because it will be same as the legacy HO . As mentioned the new UE behavior of NR-U HO requirement is about the LBT failures on the target cell. |
| Ericsson: prefer Proposal 1. Further, for intra-RAT, both intra- and inter-frequency are considered. |
| Huawei: Similar views as MTK regarding 3 to reduce the test cases number. |
| Nokia: we can agree to the deprioritize as proposed by MTK (cases 1, 2, 4 and 7). We can keep the other test cases in the FFS, and check if there is another way to cover these requirements without the need to create new test cases. |

#### Issue 3-3-4: RRC Re-establishment test cases

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| **Issue 3-3-4: RRC Re-establishment test cases**   * Proposals   + Proposal 1 (Ericsson, R4-2016416): Test cases to be introduced for:     - RRC Re-establishment NR-U/NR(FR1) -> NR-U   + Proposal 2 (MediaTek, R4-2014872):     - SA: RRC Re-establishment to a Cell with CCA   + Proposal 3 (Qualcomm, R4-2016567 and Nokia, R4-2015390)     - Intra-frequency RRC Re-establishment in NR-U     - Inter-frequency RRC Re-establishment in NR-U     - Intra-frequency RRC Re-establishment in NR-U without serving cell timing * Recommended WF   + - **This is the placeholder for eventual comments related to the RRC Re-establishment tests in Issue 3-3-1. From the moderator perspective, the following test cases are not controversial, and could be agreed:**       1. **Intra-frequency RRC Re-establishment in NR-U**       2. **Inter-frequency RRC Re-establishment in NR-U**       3. **Intra-frequency RRC Re-establishment in NR-U without serving cell timing**     - **Discuss the other test cases (if anything needs to be added besides what was captured on the test case list) Is it necessary to define the test case below? Also discuss if any other test cases need to be introduced.**       1. **RRC Re-establishment from NR to NR-U** |
| MTK: 1, 2, 3 should be merged in to one test, because the re-establish delay includes CCA and without CCA, intra-freq. and inter-freq.  It is no need to have a separate test for case of “RRC Re-establishment from NR to NR-U”, because it has already included by the above test. |
| Ericsson: prefer Proposal 1, including intra- and inter-frequency. |
| Apple: agree with proposal 1/2 |
| Huawei: Prefer option 1. |
| Nokia: agree with the proposed WF. For MTK’s proposal: the difference would be then on the test configuration to capture the other cases? |

#### Issue 3-3-5: Random access

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| **Issue 3-3-5: Random access**  **Background: Core requirements were not discussed in RAN4, despite the agreement in R4-1912662 that a new clause with Random access requirements would be created in TS 38.133. Core requirements are currently being discussed in thread 205.**   * Proposals   + Proposal 1 (Ericsson, R4-2016416): (requirements not available yet):     - Contention-based and non-contention based RA:       1. to NR-U PCell       2. to NR-U PSCell   + Proposal 2 (MediaTek, R4-2014872):     - Regarding random access, new dedicated TCs are not necessary.   + Proposal 3 (Nokia, R4-2015390)     - Test cases are needed, depending on the decision regarding the core requirements for both 2-step and 4-step RA type, and for NR-U PSCell and NR-U PCell. * Recommended WF   + - **The core requirements are being discussed in thread 205. The moderator suggests that this issue is discussed in the 2nd round, after some views are collected in the other e-mail discussion.** |

#### Issue 3-3-6: RRC Connection Release with redirection

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| **Issue 3-3-6: RRC Connection Release with redirection**   * Proposals   + Proposal 1 (Ericsson, R4-2016416) RRC Connection Release with redirection tests:  |  | | --- | | * NR-U/NR(FR1) -> NR-U | |  |  * + Proposal 2 (MediaTek, R4-2014872):     - Redirection from NR in FR1 to NR in FR1 with CCA   + Proposal 3 (Qualcomm, R4-2016567):     - Redirection from NR in FR1 to NR-U   + Proposal 4 (Nokia)     - RRC connection release with redirection with CCA * Recommended WF   + - **This is the placeholder for eventual comments related to the RRC Connection release with redirection tests in Issue 3-3-1. From the moderator perspective, the following test case is not controversial, and could be agreed:**  1. **Redirection from NR in FR1 to NR in FR1 with CCA**    * + **Discuss the other test cases (if anything needs to be added besides what was captured on the test case list) Is it necessary to define the test case below? Also discuss if any other test cases need to be introduced.** 2. **Redirection from NR in FR1 with CCA to NR in FR1 with CCA** |
| MTK: New test for “Redirection from NR in FR1 with CCA to NR in FR1 with CCA” is not necessary. Because the new UE behaviour is about the LTB failure on the target cell, so it has already been verified. |
| Ericsson: prefer Proposal 1. |
| Apple: agree with proposal 1/2 |
| Huawei: Prefer option 1. |
| Nokia: agree with MediaTek |

#### Issue 3-3-7: Timing

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| **Issue 3-3-7: Timing**   * Proposals   + Proposal 1 (Ericsson, R4-2016416)   + Timing (transmit timing and timing advance):  |  |  | | --- | --- | | * NR-U PCell * NR-U PSCell | | |  | |  * + Proposal 2 (MediaTek, R4-2014872):     - UE maximum receive timing difference: No, because no NR-U specific RRM core requirement.     - UE transmit timing: Yes     - UE maximum transmit timing difference: No, because no NR-U specific RRM core requirement.     - TA: No, because no NR-U specific RRM core requirement.   + Proposal 3 (Qualcomm, R4-2016567):     - Transmit timing test for NR-U   + Proposal 4 (Nokia)     - UE transmit timing with NR-U Pcell, Scell and PSCell as reference timing cell * Recommended WF   + - **This is the placeholder for eventual comments related to the timing related tests in Issue 3-3-1. From the moderator perspective, the following test cases are not controversial, and could be agreed:**  1. **UE transmit timing with NR-U Pcell** 2. **UE transmit timing with NR-U PSCell**    * + **Discuss the other test cases (if anything needs to be added besides what was captured on the test case list) Is it necessary to define the test case below? Also discuss if any other test cases need to be introduced.** 3. **Timing advance tests** |
| MTK: TA test for NR-U seems not necessary, no new UE ehaviour introduced by NR-U. |
| Ericsson: prefer Proposal 1. |
| Apple: agree with recommended WF |
| Huawei: TA test cases for NR-U are not needed. |
| Nokia: Agree with tests 1 and 2. Timing Advance requirements can be further studied. |

#### Issue 3-3-8: BWP switching delay and interruptions

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| **Issue 3-3-8: BWP switching delay and interruptions**   * Proposals   + Proposal 1 (Ericsson, R4-2016416)  |  | | --- | | * DCI/timer/RRC-based BWP switching on NR-U SCell, with:   + NR PCC (PCC)   + NR-U PCC   + NR-U PSCC and E-UTRAN PCC (FDD, TDD)   + NOTE: verify BWP switching under consistent UL failure. Legacy BWP is to be verified only in SA. |  * + Proposal 2 (MediaTek, R4-2014872):     - Interruptions at active BWP switching: Not necessary, the interruption is the same as R15.     - Active BWP switching delay; Not necessary, the delay is the same as R15.     - BWP switch delay on Consistent UL LBT recovery: Yes   + Proposal 3 (Qualcomm, R4-2016567):     - E-UTRAN – NR-U PSCell UL active BWP switch based on persistent UL LBT failure     - NR-U – NR-U PCell UL active BWP switch based on persistent UL LBT failure   + Proposal 4 (Nokia)     - Consistent UL LBT failure based Active BWP switch     - PCell and PSCell * Recommended WF   + - **This is the placeholder for eventual comments related to the active BWP switch tests in Issue 3-3-1. From the moderator perspective, the following test case is not controversial, and could be agreed:**  1. **E-UTRAN – NR-U PSCell UL active BWP switch based on persistent UL LBT failure** 2. **NR-U – NR-U PCell UL active BWP switch based on persistent UL LBT failure**    * + **Discuss the other test cases (if anything needs to be added besides what was captured on the test case list) Is it necessary to define the test case below? Also discuss if any other test cases need to be introduced.** 3. **DCI/timer/RRC-based BWP switching on NR-U SCell, with:**    * + - 1. **NR PCC (PCC)**          2. **NR-U PCC**          3. **NR-U PSCC and E-UTRAN PCC (FDD, TDD)**   **NOTE: verify BWP switching under consistent UL failure. Legacy BWP is to be verified only in SA.** |
| MTK: Agree with the test for persistent UL LBT failure.  Legacy DCI/timer/RRC-based BWP switching on NR-U cell is not necessary because we don’t need to test the legacy again. |
| Ericsson: prefer Proposal 1 |
| Nokia: Agree with the test for persistent UL LBT failure. For the legacy requirements, as said before, can we maybe create a new configuration on the existing test to test the requirement? We would like to check if there is any other way rather than creating a new test case to solve this issue. |

#### Issue 3-3-9: Radio Link Monitoring

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| **Issue 3-3-9: Radio Link Monitoring**   1. Proposals    1. Proposal 1 (Ericsson, R4-2016416)  |  | | --- | | * In-sync and out-of-sync tests:   + On NR-U PCC   + On NR-U PSCC, with E-UTRAN PCC (FDD,TDD) |  * 1. Proposal 2 (MediaTek, R4-2014872):      + Requirements for SSB based RLM   2. Proposal 3 (Qualcomm, R4-2016567):      + Radio Link Monitoring Out-of-sync Test for NR-U PSCell configured with SSB-based RLM RS in non-DRX mode      + Radio Link Monitoring In-sync Test for NR-U PSCell configured with SSB-based RLM RS in non-DRX mode      + Radio Link Monitoring Out-of-sync Test for NR-U PSCell configured with SSB-based RLM RS in DRX mode      + Radio Link Monitoring In-sync Test for NR-U PSCell configured with SSB-based RLM RS in DRX mode      + Radio Link Monitoring Out-of-sync Test for NR-U PCell configured with SSB-based RLM RS in non-DRX mode      + Radio Link Monitoring In-sync Test for NR-U PCell configured with SSB-based RLM RS in non-DRX mode      + Radio Link Monitoring Out-of-sync Test for NR-U PCell configured with SSB-based RLM RS in DRX mode      + Radio Link Monitoring In-sync Test for NR-U PCell configured with SSB-based RLM RS in DRX mode   3. Proposal 4 (Nokia)      + • RLM Out-of-sync with CCA with side conditions (≥-7 dB and <-7 dB)      + • RLM In-sync with CCA      + • Only for SSB-based RLM      + • PSCell and PCell      + • DRX and non-DRX modes      + • LBE and FBE  1. Recommended WF    * + **This is the placeholder for eventual comments related to the RLM tests in Issue 3-3-1. From the moderator perspective, the following test cases are not controversial, and could be agreed:** 2. **Radio Link Monitoring Out-of-sync Test for NR-U PSCell configured with SSB-based RLM RS in non-DRX mode** 3. **Radio Link Monitoring In-sync Test for NR-U PSCell configured with SSB-based RLM RS in non-DRX mode** 4. **Radio Link Monitoring Out-of-sync Test for NR-U PSCell configured with SSB-based RLM RS in DRX mode** 5. **Radio Link Monitoring In-sync Test for NR-U PSCell configured with SSB-based RLM RS in DRX mode** 6. **Radio Link Monitoring Out-of-sync Test for NR-U PCell configured with SSB-based RLM RS in non-DRX mode** 7. **Radio Link Monitoring In-sync Test for NR-U PCell configured with SSB-based RLM RS in non-DRX mode** 8. **Radio Link Monitoring Out-of-sync Test for NR-U PCell configured with SSB-based RLM RS in DRX mode** 9. **Radio Link Monitoring In-sync Test for NR-U PCell configured with SSB-based RLM RS in DRX mode** |
| MTK: agree with the recommended WF. |
| Ericsson: Prefer Proposal 1 (note that FDD and TDD E-UTRA PCell are separate test cases), SSB-based. |
| Huawei: OOS with different SINR conditions should be tested. |
| Nokia: agree with the recommended WF, and also believe that OOS with different SINR conditions should be tested, since the requirements are different. |

#### Issue 3-3-10: Beam management

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| **Issue 3-3-10: Beam Management**   * Proposals   + Proposal 1 (Ericsson, R4-2016416)  |  | | --- | | * • On NR-U PCC * • On NR-U PSCC, with E-UTRAN PCC (FDD,TDD) |  * + Proposal 2 (MediaTek, R4-2014872):     - Requirements for SSB-based beam failure detection and candidate beam detection   + Proposal 3 (Qualcomm, R4-2016567):     - EN-DC Beam Failure Detection and Link Recovery Test for NR-U PSCell configured with SSB-based BFD and LR in non-DRX mode     - EN-DC Beam Failure Detection and Link Recovery Test for NR-U PSCell configured with SSB-based BFD and LR in DRX mode     - Beam Failure Detection and Link Recovery Test for NR-U PCell configured with SSB-based BFD and LR in non-DRX mode     - Beam Failure Detection and Link Recovery Test for NR-U PCell configured with SSB-based BFD and LR in DRX mode   + Proposal 4 (Nokia)     - • SSB-based Beam failure detection recovery test     - • PCell and PSCell     - • DRX and non-DRX mode     - • LBE and FBE * Recommended WF   + - **This is the placeholder for eventual comments related to the Link Recovery tests in Issue 3-3-1. From the moderator perspective, the following test cases are not controversial, and could be agreed:** * **EN-DC Beam Failure Detection and Link Recovery Test for NR-U PSCell configured with SSB-based BFD and LR in non-DRX mode** * **EN-DC Beam Failure Detection and Link Recovery Test for NR-U PSCell configured with SSB-based BFD and LR in DRX mode** * **Beam Failure Detection and Link Recovery Test for NR-U PCell configured with SSB-based BFD and LR in non-DRX mode** * **Beam Failure Detection and Link Recovery Test for NR-U PCell configured with SSB-based BFD and LR in DRX mode**   **Also discuss if any other test cases need to be introduced.** |
| MTK: agree with the recommended WF. |
| Ericsson: Prefer Proposal 1 (note that FDD and TDD E-UTRA PCell are separate test cases), SSB-based. |
| Apple: agree with recommended WF |
| Nokia: Agree with the recommended WF. |

#### Issue 3-3-11: SCell activation/ deactivation delay

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| **Issue 3-3-11: SCell Activation and Deactivation delay**   * Proposals   + Proposal 1 (Ericsson, R4-2016416)  |  | | --- | | For known and unknown target NR-U SCell, with:  • NR PCC (FR1)  • NR-U PCC  • NR-U PSCC and E-UTRAN PCC (FDD, TDD) |  * + Proposal 2 (MediaTek, R4-2014872):     - SCell Activation and deactivation   + Proposal 3 (Qualcomm, R4-2016567):     - SCell Activation and deactivation of known SCell in NR-U for 160ms SCell measurement cycle     - SCell Activation and deactivation of known SCell in NR-U for 320 ms SCell measurement cycle     - SCell Activation and deactivation of unknown SCell in NR-U   + Proposal 4 (Nokia)   • SCell activation and deactivation in carriers with CCA (SA & EN-DC tests)  • Known case and unknown  • 160 ms and 320 ms SCell measurement cycle  • DRX and non-DRX  • LBE and FBE   * Recommended WF   + - **This is the placeholder for eventual comments related to the SCell Activation / Deactivation tests in Issue 3-3-1. From the moderator perspective, the following test cases are not controversial, and could be agreed:**  1. **SCell Activation and deactivation of known SCell in NR-U for 160ms SCell measurement cycle** 2. **SCell Activation and deactivation of known SCell in NR-U for 320 ms SCell measurement cycle** 3. **SCell Activation and deactivation of unknown SCell in NR-U**   **Further discuss: SCell Activation and deactivation in the different Scenarios: E-UTRAN PCC; NR PCC, NR-U PCC and NR-U PSCC. Also discuss if any other test cases need to be introduced.** |
| MTK: agree with 1-3  E-UTRAN PCC; NR PCC, NR-U PCC and NR-U PSCC would be all needed, while UE shall pass test under one of the scenario. |
| Ericsson: Prefer Proposal 1 (note that FDD and TDD E-UTRA PCell are separate test cases. Measurement cycles are TBD. |
| Nokia: agree with the test cases, and definition of the tests in E-UTRAN PCC; NR PCC, NR-U PCC and NR-U PSCC. |

#### Issue 3-3-12: PSCell addition/release delay

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| **Issue 3-3-12: PSCell addition/release delay**   * Proposals   + Proposal 1 (Ericsson, R4-2016416)  |  | | --- | | For known and unknown target NR-U PSCell, with:  • E-UTRA PCC |  * + Proposal 2 (MediaTek, R4-2014872):     - NR-U PSCell addition/release delays: test cases are needed   + Proposal 3 (Qualcomm, R4-2016567):     - Addition and Release Delay of known NR-U PSCell   •   * Recommended WF   + - **This is the placeholder for eventual comments related to PSCell addition/ release dealy tests in Issue 3-3-1. From the moderator perspective, the following test cases are not controversial, and could be agreed:**  1. **Addition and Release Delay of known NR-U PSCell**   **Further discuss: unknown case, and if any other test case should be introduced.** |
| MTK: By following the practice in R15, it can focus on known and not to specify tests for unknown PSCell . E.g.,  A.4.5.7.1 Addition and Release Delay of known NR PSCell |
| Ericsson: Prefer Proposal 1 (note that FDD and TDD E-UTRA PCell are separate test cases). |
| Nokia: Agree with the WF. We can follow Rel-15 principles and test only the known case. |

#### Issue 3-3-13: Active TCI State Switching delay

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| **Issue 3-3-13: Active TCI State Switching delay**   * Proposals   + Proposal 1 (Ericsson, R4-2016416)  |  | | --- | | For known and unknown target TCI state in NR-U, on:  • NR-U PCC  • NR-U SCC, with NR PCC (FR1)  • NR-U PSCC, with E-UTRAN PCC (FDD, TDD) |  * + Proposal 2 (Nokia, R4-2015290 )     - Active TCI State switching delay when CCA is used on target frequency       * • MAC CE and RRC       * • Known TCI State * Recommended WF   + - **Currently there are no tests for TCI state switch tests in NR FR1. However, RAN4 did introduce new requirements for active TCI state switch in the NR-U WI in Rel-16. So, the recommended WF is:**        * **Discuss the proposals. Moderator suggests the following test cases to be considered, (based on the current test cases for FR2):**         + **E-UTRAN – NR PSCell in FR1 with CCA active TCI state switch for a known TCI state (MAC CE based)**         + **E-UTRAN – NR PSCell in FR1 with CCA active TCI state switch for a known TCI state (RRC based)**         + **NR PCell FR1 with CCA active TCI state switch for a known TCI state (MAC CE based)**         + **NR PCell FR1 with CCA active TCI state switch for a known TCI state (RRC based)**       * **Also discuss test cases for unknown target TCI states in the 1st round.** |
| MTK: Suggest low priority for TCI test in FR1, since no R15 baseline. |
| Ericsson: Prefer Proposal 1. |
| Apple: follow the legacy NR logic, no test case is needed |
| Nokia: We believe that all requirements that were created / modified for NR-U should be teste.d So we agree with the WF. |

#### Issue 3-3-14: Interruptions

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| **Issue 3-3-14: Interruptions**   * Proposals   + Proposal 1 (Ericsson, R4-2016416)  |  | | --- | | Due to NR-U SCell addition/release, with:  • NR PCC (FR1)  • NR-U PCC  • NR-U PSCC and E-UTRAN PCC (FDD,TDD)  Due to NR-U SCell activation/deactivation, with:  • NR PCC (FR1)  • NR-U PCC  • NR-U PSCC and E-UTRAN PCC (FDD,TDD)  During measurements no deactivated NR-U SCell, with:  • NR PCC (FR1)  • NR-U PCC  • NR-U PSCC and E-UTRAN PCC (FDD,TDD)  Due to inter-RAT SFTD measurements between:  • NR-U PCell and E-UTRAN PCell (FDD,TDD)  Due to NR-U PSCell addition/release, with:  • E-UTRA Pcell |  * + Proposal 2 (MediaTek, R4-2014872):     - Regarding interruption, new TCs are not necessary except for the scenario would have multiple interruption windows, e.g. SCell activation/deactivation and PCell addition/release. * Recommended WF   **Discuss the proposals, stating which interruptions would be necessary, and why.** |
| MTK: New behavior such as multiple interruption windows for SCell activation/deactivation and PCell addition/release will need new tests. For the interruption as the legacy, where LBT is not involved, the new tests are not necessary. |
| Ericsson: Prefer Proposal 1. |
| Nokia: same view as Mediatek. New interruptions should be tested, RAN4 can further discuss how to test UEs that do not support legacy NR (if that is a relevant case), before agreeing on re-defining all NR test cases within the NR-U work item. |

#### Issue 3-3-15: Intra-frequency measurement procedure

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| **Issue 3-3-15: Intra-frequency measurement procedure**   * Proposals   + Proposal 1 (Ericsson, R4-2016416)  |  | | --- | | Intra-frequency SS-RSRP, SS-RSRQ, SS-SINR measurements on: | |         NR-U SCC, with NR PCC (FR1) | |         NR-U PCC | |         NR-U SCC, with NR-U PCC | |         NR-U PSCC, with E-UTRAN PCC (FDD,TDD) | |         NR-U SCC measurements, with E-UTRAN PCC (FDD,TDD) and NR-U PSCC | | L1-RSRP measurements on: | |         NR-U SCC, with NR PCC (FR1) | |         NR-U PCC | |         NR-U SCC, with NR-U PCC | |         NR-U PSCC, with E-UTRAN PCC (FDD,TDD) | |         NR-U SCC measurements, with E-UTRAN PCC (FDD,TDD) and NR-U PSCC | | Intra-frequency RSSI measurements on: | |         NR-U SCC, with NR PCC (FR1) | |         NR-U PCC | |         NR-U SCC, with NR-U PCC | |         NR-U PSCC, with E-UTRAN PCC (FDD,TDD) | |         NR-U SCC measurements, with E-UTRAN PCC (FDD,TDD) and NR-U PSCC | | Intra-frequency CO measurements on: | |         NR-U SCC, with NR PCC (FR1) | |         NR-U PCC | |         NR-U SCC, with NR-U PCC | |         NR-U PSCC, with E-UTRAN PCC (FDD,TDD) | |         NR-U SCC measurements, with E-UTRAN PCC (FDD,TDD) and NR-U PSCC |  * + Proposal 2 (MediaTek, R4-2014872):     - Regarding SS-RSRQ/SS-SINR, the new TCs are not necessary. The UE behavior in CCA can be covered by the tests for SS-RSRP with CCA.     - Regarding RSSI, FFS the TCs when CSSF for RSSI is concluded.     - intra-frequency: SS-RSRP/SS-RSRQ/SS- SINR, L1 RSRP for reporting Yes. But it would be possible to have test for RSRP but not for RSRQ/SINR, because the CCA behaviour of SS-RSRQ/SS-SINR is similar to SS-RSRP.     - Inter-frequency Yes     - RSSI FFS, some ongoing discussion, e.g. CSSF.     - Inter-RAT, NR-U to E-UTRAN No, it is irrelevant to NR-U behavior     - Inter-RAT, E-UTRAN to NR-U Yes   + Proposal 3 (Qualcomm, R4-2016567):     - EN-DC event triggered reporting tests without gap under non-DRX     - EN-DC event triggered reporting tests without gap under DRX     - EN-DC event triggered reporting tests with per-UE gaps under non-DRX     - EN-DC event triggered reporting tests with per-UE gaps under DRX     - EN-DC event triggered reporting tests without gap under non-DRX with SSB index reading     - EN-DC event triggered reporting tests with per-UE gaps with SSB index reading     - SA event triggered reporting tests without gap under non-DRX     - SA event triggered reporting tests without gap under DRX     - SA event triggered reporting tests with per-UE gaps under non-DRX     - SA event triggered reporting tests with per-UE gaps under DRX     - SA event triggered reporting tests without gap under non-DRX with SSB index reading     - SA event triggered reporting tests with per-UE gaps under non-DRX with SSB index reading     - [EN-DC] SSB based L1-RSRP measurement when DRX is not used     - [EN-DC] SSB based L1-RSRP measurement when DRX is used     - [SA] SSB based L1-RSRP measurement when DRX is not used     - [SA] SSB based L1-RSRP measurement when DRX is used   + Proposal 4 (Nokia)     - Event triggered intra-frequency measurement, for SA & EN-DC,   • With and without measurement gap  • DRX and non-DRX  • With and without SSB index reading  • LBE and FBE  • RSSI & Channel Occupancy – no need for testing LBT   * + - • SSB based L1-RSRP measurement       * • DRX and non-DRX       * • LBE and FBE * Recommended WF   + - **This is the placeholder for eventual comments related to the Intra-frequency measurement procedure tests in Issue 3-3-1. From the moderator perspective, the following test cases are not controversial, and could be agreed:**  1. **EN-DC event triggered reporting tests without gap under non-DRX** 2. **EN-DC event triggered reporting tests without gap under DRX** 3. **EN-DC event triggered reporting tests with per-UE gaps under non-DRX** 4. **EN-DC event triggered reporting tests with per-UE gaps under DRX** 5. **EN-DC event triggered reporting tests without gap under non-DRX with SSB index reading** 6. **EN-DC event triggered reporting tests with per-UE gaps with SSB index reading** 7. **SA event triggered reporting tests without gap under non-DRX** 8. **SA event triggered reporting tests without gap under DRX** 9. **SA event triggered reporting tests with per-UE gaps under non-DRX** 10. **SA event triggered reporting tests with per-UE gaps under DRX** 11. **SA event triggered reporting tests without gap under non-DRX with SSB index reading** 12. **SA event triggered reporting tests with per-UE gaps under non-DRX with SSB index reading** 13. **[EN-DC] SSB based L1-RSRP measurement when DRX is not used** 14. **[EN-DC] SSB based L1-RSRP measurement when DRX is used** 15. **[SA] SSB based L1-RSRP measurement when DRX is not used** 16. **[SA] SSB based L1-RSRP measurement when DRX is used**   **Further discuss whether other tests would be needed, and please address these two proposals in your comments. These proposals are also relevant for the inter-frequency discussion.**   * + - Regarding SS-RSRQ/SS-SINR, the new TCs are not necessary. The UE behavior in CCA can be covered by the tests for SS-RSRP with CCA.     - Regarding RSSI, FFS the TCs when CSSF for RSSI is concluded. |
| MTK: In order to avoid too-many test, new test for SS-RSRQ/SS-SINR would be not necessary, because the LBT impact can be reflected in the tests for SS-RSRP.  Regarding RSSI, the measurement period will be impacted by the CSSF. Thus, the delay should be revisited when the CSSF of RSSI is concluded. |
| Ericsson: Prefer Proposal 1. SS-RSRQ/SINR need also testing. |
| Apple: shall clarify that UE only need to pass the test under one CCA scenario. |
| Nokia: We agree to the proposed WF; Are OK to revise the RSSI tests when the CSSF is finished, and believe that we need SS-RSRQ, SS-RSRP and SS-SINR to be tested as well. The clarification that is being requested by Apple is being discussed in a different issue, we agree with the observation. |

#### Issue 3-3-16: Inter-frequency measurement procedure

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| **Issue 3-3-16: Inter-frequency measurement procedure**   * Proposals   + Proposal 1 (Ericsson, R4-2016416)   Inter-frequency SS-RSRP, SS-RSRQ, SS-SINR measurements on:  • NR-U inter-frequency, with NR PCC (FR1)  • NR-U inter-frequency, with NR-U PCC  • NR-U inter-frequency, with NR-U PSCC and E-UTRAN PCC (FDD,TDD)  • NR (FR1) inter-frequency, with NR-U PCC  • NR (FR1) inter-frequency, with NR-U PSCC and E-UTRAN PCC (FDD,TDD)  Inter-frequency RSSI measurements on:  • NR-U inter-frequency, with NR PCC (FR1)  • NR-U inter-frequency, with NR-U PCC  • NR-U inter-frequency, with NR-U PSCC and E-UTRAN PCC (FDD,TDD)  Inter-frequency CO measurements on:  • NR-U inter-frequency, with NR PCC (FR1)  • NR-U inter-frequency, with NR-U PCC  • NR-U inter-frequency, with NR-U PSCC and E-UTRAN PCC (FDD,TDD)   * Recommended WF   + - **This is the placeholder for eventual comments related to the Inter-frequency measurement procedure tests in Issue 3-3-1. From the moderator perspective, the following test cases are not controversial, and could be agreed:**  1. **EN-DC event triggered reporting tests for FR1 cell without SSB time index detection when DRX is not used** 2. **EN-DC event triggered reporting tests for FR1 cell without SSB time index detection when DRX is used** 3. **EN-DC event triggered reporting tests for FR1 cell with SSB time index detection when DRX is not used** 4. **EN-DC event triggered reporting tests for FR1 cell with SSB time index detection when DRX is used** 5. **SA event triggered reporting tests for FR1 without SSB time index detection when DRX is not used** 6. **SA event triggered reporting tests for FR1 without SSB time index detection when DRX is used** 7. **SA event triggered reporting tests for FR1 with SSB time index detection when DRX is not used** 8. **SA event triggered reporting tests for FR1 with SSB time index detection when DRX is used**   **Further discuss whether other tests would be needed.** |
| MTK: same comment as on Issue 3-3-15. |
| Ericsson: Prefer Proposal 1 |
| Apple: shall clarify that UE only need to pass the test under one CCA scenario. |
| Nokia: same comments as on issue 3-3-15 |

#### Issue 3-3-17: Inter-RAT measurement procedure

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| **Issue 3-3-17: Inter-RAT measurement procedure**   * Proposals   + Proposal 1 (Ericsson, R4-2016416)   Inter-RAT SFTD between:  • E-UTRAN PCell (FDD,TDD) and NR-U neighbor  NOTE: under the condition of stationary paths  NR-U-E-UTRA RSRP/RSRQ (needed for HO):  • On E-UTRA (FDD,TDD), with NR-U PCC  • On E-UTRA (FDD,TDD), with NR-U PSCC  E-UTRA-NR-U SS-RSRP/SS-RSRQ/SS-SINR:  • On NR-U neighbor, with E-UTRA (FDD,TDD) PCC  • On NR-U neighbor, with E-UTRA (FDD,TDD) PCC and NR-U PSCC   * + Proposal 2 (Nokia, R4-2015390)     - E-UTRAN (FDD , TDD) – NR measurements when CCA is used   • NR Inter-RAT event triggered reporting tests with CCA  • With/without SSB time index detection  • DRX and non-DRX  • LBE and FBE  • RSSI measurements  • Channel Occupancy measurements   * Recommended WF   + - **This is the placeholder for eventual comments related to the Inter-RAT measurement procedure tests in Issue 3-3-1. Discuss the proposals.** |
| MTK: Regarding Inter-RAT SFTD between E-UTRAN PCell (FDD,TDD) and NR-U neighbor, the UE should be cable for NR-U PCell/NR-U PSCell. |
| Ericsson: Prefer Proposal 1. |
| Nokia: Proposal 1 is fine. We can capture MTK comment in the 2nd round. |

#### Issue 3-3-18: Measurement accuracy tests

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| **Issue 3-3-18: Measurement accuracy tests**   * Proposals   + Proposal 1 (Nokia, R4-2015390)     - RAN4 to discuss the needed test cases for measurement performance requirements after detailing how to capture the performance requirements in the specification.   + Proposal 2 (Ericsson, R4-2016416)   Intra-frequency absolute and relative accuracies for SS-RSRP on:  • NR-U SCC, with NR PCC (FR1)  • NR-U PCC  • NR-U SCC, with NR-U PCC  • NR-U PSCC, with E-UTRAN PCC (FDD,TDD)  • NR-U SCC, with NR-U PSCC and E-UTRAN PCC (FDD,TDD)  Intra-frequency absolute accuracies for SS-RSRQ on:  • NR-U SCC, with NR PCC (FR1)  • NR-U PCC  • NR-U SCC, with NR-U PCC  • NR-U PSCC, with E-UTRAN PCC (FDD,TDD)  • NR-U SCC, with NR-U PSCC and E-UTRAN PCC (FDD,TDD)  Intra-frequency absolute accuracies for SS-SINR on:  • NR-U SCC, with NR PCC (FR1)  • NR-U PCC  • NR-U SCC, with NR-U PCC  • NR-U PSCC, with E-UTRAN PCC (FDD,TDD)  • NR-U SCC, with NR-U PSCC and E-UTRAN PCC (FDD,TDD)  Absolute and relative accuracies for L1-RSRP on:  • NR-U SCC, with NR PCC (FR1)  • NR-U PCC  • NR-U SCC, with NR-U PCC  • NR-U PSCC, with E-UTRAN PCC (FDD,TDD)  • NR-U SCC, with NR-U PSCC and E-UTRAN PCC (FDD,TDD)  Intra-frequency RSSI on:  • NR-U SCC, with NR PCC (FR1)  • NR-U PCC  • NR-U SCC, with NR-U PCC  • NR-U PSCC, with E-UTRAN PCC (FDD,TDD)  • NR-U SCC, with NR-U PSCC and E-UTRAN PCC (FDD,TDD)  Intra-frequency CO on:  • NR-U SCC, with NR PCC (FR1)  • NR-U PCC  • NR-U SCC, with NR-U PCC  • NR-U PSCC, with E-UTRAN PCC (FDD,TDD)  • NR-U SCC, with NR-U PSCC and E-UTRAN PCC (FDD,TDD)  Inter-frequency absolute and relative accuracies for SS-RSRP on:  • NR-U neighbor, with NR PCC (FR1)  • NR-U neighbor, with NR-U PCC  • NR-U neighbor, with NR-U PSCC, with E-UTRAN PCC (FDD,TDD)  Inter-frequency absolute and relative accuracies for SS-RSRQ on:  • NR-U neighbor, with NR PCC (FR1)  • NR-U neighbor, with NR-U PCC  • NR-U neighbor, with NR-U PSCC, with E-UTRAN PCC (FDD,TDD)  Inter-frequency absolute and relative accuracies for SS-SINR on:  • NR-U neighbor, with NR PCC (FR1)  • NR-U neighbor, with NR-U PCC  • NR-U neighbor, with NR-U PSCC, with E-UTRAN PCC (FDD,TDD)  • NR (FR1) inter-frequency, with NR-U PCC  • NR (FR1) inter-frequency, with NR-U PSCC and E-UTRAN PCC (FDD,TDD)  Inter-frequency RSSI on:  • NR-U neighbor, with NR PCC (FR1)  • NR-U neighbor, with NR-U PCC  • NR-U neighbor, with NR-U PSCC, with E-UTRAN PCC (FDD,TDD)  Inter-frequency CO on:  • NR-U neighbor, with NR PCC (FR1)  • NR-U neighbor, with NR-U PCC  • NR-U neighbor, with NR-U PSCC, with E-UTRAN PCC (FDD,TDD)  Inter-RAT SFTD between:  • E-UTRAN PCell (FDD,TDD) and NR-U neighbor  NOTE: under the condition of stationary paths  E-UTRA RSRP/RSRQ (needed for HO) with:  • NR-U PCC  • NR-U PSCC  E-UTRA-NR-U SS-RSRP/SS-RSRQ/SS-SINR:  • On NR-U neighbor, with E-UTRA (FDD,TDD) PCC   * + • On NR-U neighbor, with E-UTRA (FDD,TDD) PCC and NR-U PSCC * Recommended WF   + - **This is the placeholder for eventual comments related to the accuracy tests in Issue 3-3-1. Discuss the proposals.** |
| MTK: same comment as on Issue 3-3-15.  In order to avoid too-many test, new test for SS-RSRQ/SS-SINR would be not necessary, because the LBT impact can be reflected in the tests for SS-RSRP. |
| Ericsson: prefer proposal 2 |
| Apple: shall clarify that UE only need to pass the test under one CCA scenario. |
| Nokia: also fine with Proposal 2.The clarification requested by Apple is being discussed in a different issue. We believe that SS-RSRQ and SS-SINR should be tested. |

### Sub-topic 3-4: Work Plan & Work Split

Issues to be discussed in this sub-topic:

Issue 3-4-1: Division of the work in 2 phases

Issue 3-4-2: Work Plan

Issue 3-4-3: Work Split (this will be left for the 2nd round)

#### Issue 3-4-1: Division of the work in 2 phases

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| **Issue 3-4-1: Division of the work in 2 phases**   * Proposals   + Option 1 (Ericsson, R4-2016415 & R4-2016416):     - The work on NR-U RRM test cases is divided into at least two phases.     - Phase I:       * RRC\_IDLE, cell reselection       * HO delay and interruption       * Timing       * Radio Link Monitoring       * SCell activation and deactivation delay       * Interruptions (all but the ones related to inter-RAT SFTD and NR-U PSCell addition/ release)       * Intra-frequency Measurement procedure         + SS-RSRP, SS-RSRQ, SS-SINR         + L1-RSRP         + RSSI measurements       * Inter-frequency measurement procedure         + SS-RSRP, SS-RSRQ, SS-SINR       * Inter-RAT measurement procedure (SFTD)       * Accuracy for:         + Intra-frequency absolute and relative accuracies for SS-RSRP         + Inter-frequency absolute and relative accuracies for SS-RSRP         + Inter-RAT SFTD     - Phase II:       * RRC re-establishment       * Random Access       * RRC Connection Release with Redirection       * Active BWP switching (delay and interruption)       * Link recovery       * PSCell addition/ release delay       * Active TCI state switching delay       * Interruptions (Inter-RAT SFTD measurements and NR-U PSCell addition/ release)       * Intra-frequency Measurement Procedure         + Intra-frequency CO measurements       * Inter-frequency Measurement Procedure         + RSSI measurements         + CO measurements       * Inter-RAT measurement procedure (E-UTRA NR-U SS-RSRP, SS-RSRQ, SS-SINR, NR-U-E-UTRA RSRP/RSRQ)       * Accuracy for:         + Intra-frequency absolute and relative accuracies for SS-RSRQ         + Intra-frequency absolute accuracies for SS-SINR         + Absolute and relative accuracies for L1-RSRP         + Intra-frequency RSSI on         + Intra-frequency CO         + Inter-frequency absolute and relative accuracies for SS-RSRQ         + Inter-frequency absolute and relative accuracies for SS-SINR         + Inter-frequency RSSI         + Inter-frequency CO         + E-UTRA RSRP/RSRQ (needed for HO)         + E-UTRA-NR-U SS-RSRP/SS-RSRQ/SS-SINR * Recommended WF   + - * **Discuss the division of the work in two phases. Do you see it as needed? The exact work in each of the phases will depend on the discussion on which test cases are needed. We can take that specific split on the 2nd round.** |
| ZTE: We also feel that technical issues shall be discussed prior to the phase of work. We should at least settle down on the scope of test cases. |
| Ericsson: support option 1. There are actually two questions herein: whether we have 2 phases and then how to split (the latter depends also on the agreed list). |
| MTK: Generally agree with 2-phases approach. FFS the rule to categorize test. We suggest to prioritize put Scenario A related requirements in Phase 1. |
| Huawei: Generally fine with 2-phases approach. The split should be based on the agreed list. Whether to split by test cases or scenarios needs discussion. |
| Nokia: We agree that the work can be split in 2-phases. Which requirements will be discussed in each phase can be further discussed. |

#### Issue 3-4-2: Work Plan

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| **Issue 3-4-2: Work Plan**   * Proposals   + Option 1 (Ericsson, R4-2016416):     - Time plan for developing NR-U test cases:       * RAN4#97-e (Nov 2020):         + Agree on high-level list for test cases, work split, and specification structure       * RAN4#98-e (Jan 2021):         + Discuss and agree on basic common configurations and configuration details at least for Phase I test cases       * RAN4#98-bis-e (April 2021):         + Provide first drafts for Phase I test cases         + Agree on common configurations and configuration details for Phase II test cases       * RAN4#99-e (May 2021):         + Provide final CRs for Phase I test cases.         + Provide first drafts for Phase II test cases.       * RAN4#100(August 2021):         + Provide final CRs for Phase II test cases.   + Option 2 (Qualcomm, R4-2016567)     - RAN4 #97e (Oct-Nov 2020)       * Way forward on general framework and test cases split     - RAN4 #98e (Jan-Feb 2021)       * CR endorsement and agreement     - RAN4 #98-bis-e (April 2021)       * Remaining CR agreement       * Performance part completion * Recommended WF   + - * **Discuss the proposals above in the 1st round. From the Moderator perspective, given the potential number of test cases discussed in sub-topic 3-3, it seems more realistic to already plan for more than 3 meetings for the finalization of this work.** |
| Ericsson: support option 1 |
| MTK: Option 1 is not aligned with RANP schedule.  With unchanged schedule, we should follow Option 2 at this moment. It can be updated according to the next RANP. |
| Nokia: we understand that Option 1 is not aligned with RANP schedule. However, we do not believe that by the end of this meeting the discussion will be such as CRs are endorsed / agreed in the next meeting. There are many issues to be discussed both in the test cases list and on the test configuration, which are likely to be not finalized in this meeting. |

#### Issue 3-4-3: Work Split

This issue will not be discussed in the first round. The moderator suggests having a first version of the test cases in the 1st round, and after that to discuss the work split based on the contributions in R4-2016567 and R4-2016416.

## Companies views’ collection for 1st round

### Open issues

Comments to open issues should be captured within the Issues. Please do not add any comment in this section.

### 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** |
| [**R4-2016417**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016417.zip) | NR-U test cases structure, Ericsson |
| Nokia: In general, we agree with the CR, which is aligned with the agreements from the GTW session, but we have a minor comment: we should strive for the consistency in the clauses names (for example, in the specification, we always refer to NR-U as carrier frequencies with CCA or some variation of that, but on the last clause in this CR we refer to it as NR-U). |
| 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** |
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### 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*

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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”* |