**3GPP TSG-RAN WG4 Meeting # 99-e R4-2108134**

**Electronic Meeting, 19th – 27th May, 2021**

**Agenda item:** 6.1.6

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

**Title:** Email discussion summary for [99-e][210] 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 performance agenda (email discussion with the flag [99-e][210] NR\_unlic\_RRM\_2):

6.1.6 RRM performance requirements (38.133)

6.1.6.1 General

6.1.6.2 Measurement accuracy requirements

6.1.6.3 Test cases

6.1.6.3.1 General

\* Include test case list, common test configuration, CCA models, requirements applicability

6.1.6.3.2 RRC IDLE cell re-selection

6.1.6.3.3 HO (delay and interruptions)

6.1.6.3.4 RRC Re-establishment

6.1.6.3.5 RRC Connection Release with Redirection

6.1.6.3.6 Random access

6.1.6.3.7 Timing (transmit timing and TA)

6.1.6.3.8 BWP switching delay and interruptions

6.1.6.3.9 PSCell addition/release (delay and interruption)

6.1.6.3.10 SCell activation/deactivation (delay and interruption)

6.1.6.3.11 Other interruptions

6.1.6.3.12 RLM

6.1.6.3.13 Beam management (BFD and link recovery)

6.1.6.3.14 SS-RSRP/SS-RSRQ/SS-SINR/L1-RSRP measurement procedure (intra-frequency, inter-frequency, inter-RAT)

6.1.6.3.15 RSSI/CO measurement procedure (intra-frequency, inter-frequency, inter-RAT)

6.1.6.3.16 SFTD measurement procedure

6.1.6.3.17 SS-RSRP/SS-RSRQ/SS-SINR/L1-RSRP measurement accuracy (intra-frequency, inter-frequency, inter-RAT)

6.1.6.3.18 RSSI/CO measurement accuracy (intra-frequency, inter-frequency, inter-RAT)

6.1.6.3.19 SFTD measurement accuracy

6.1.6.3.20 Other

The discussion on this thread is organized in the following topics:

* Topic #1: NR-U RRM test configuration
* Topic #2: CCA models
* Topic #3: Test case specific details
* Topic #4: Test case list and work split

Because of the massive number of contributions and proposals under the agenda items discussed in this document, the moderator proposes the following prioritization for the discussion:

**First round:** Concentrate on the discussion on technical issues. Comments on Draft CRs are welcome, but no decision on Draft CRs is expected in the first round.

**Second round:** Conclusion for finalizing the technical agreements, and revision of the Draft CRs.

This work is organized using the Big CR approach, and a Big CR is to be agreed after the meeting as described in the chairman’s meeting’s arrangements document.

# Topic #1: NR-U RRM test configuration

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

## Companies’ contributions summary

|  |  |  |  |
| --- | --- | --- | --- |
| T-doc number | Company | Proposals / Observations |  |
| [**R4-2111516**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111516.zip) | Qualcomm  | Remaining issues on RRM performance requirements Proposal 1: SI decoding time, TSI,CCA, is kept at 1280ms in NR-U test casesProposal 2: If proposal 1 is accepted, remove the following editor’s note from section 6.2.1A.2.1 of TS 38.133*Editor’s note: The actual value for TSI-NR\_CCA is to be discussed in the performance part, considering LBT failures and receiver assumptions, etc.*  | Issue 1-2-1Issue 1-2-1 |
| [**R4-2109852**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109852.zip) | MediaTek | Discussion on RRM test cases in NR-U  Proposal 1: Add a note in each NR-U test case for verifying the legacy requirements as follows:* + In EN-DC test: The UE supporting EN-DC only on NR band(s) with shared spectrum access is required to be tested.
	+ In SA test: The UE supporting SA operation only on NR band(s) with shared spectrum access is required to be tested.
* Above the NR-U tests include:
	+ Handover
		- NR-U -> NR(FR1)
		- NR-U - > E-UTRAN (FDD,TDD)
	+ Timing advance
	+ Legacy DCI/timer/RRC-based BWP switching on NR-U SCell
	+ Interruption
		- Due to inter-RAT SFTD measurements
		- Due to NR-U PSCell addition/release

Proposal 2: SI decoding time, TSI,CCA, is kept at 1280ms during RRC re-establishment and RRC release with re-direction in NR-U networks  | Issue 1-1-1Issue 1-2-1 |

## Open issues summary

### Sub-topic 1-1 Applicability rules

*Sub-topic description*

*Open issues and candidate options before e-meeting:*

**Issue 1-1-1: How to handle legacy tests for UEs supporting only NR bands with CCA**

Considering legacy test cases for UEs supporting only NR bands with CCA, evaluate the proposals below.

Candidate proposals:

* Proposal 1a ([R4-2109852](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109852.zip)): Add a note in each NR-U test case for verifying the legacy requirements as follows:
	+ In EN-DC test: The UE supporting EN-DC only on NR band(s) with shared spectrum access is required to be tested.
	+ In SA test: The UE supporting SA operation only on NR band(s) with shared spectrum access is required to be tested.
* Proposal 1b ([R4-2109852](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109852.zip)): Above the NR-U tests include:
	+ Handover
		- NR-U -> NR(FR1)
		- NR-U - > E-UTRAN (FDD,TDD)
	+ Timing advance
	+ Legacy DCI/timer/RRC-based BWP switching on NR-U SCell
	+ Interruption
		- Due to inter-RAT SFTD measurements
		- Due to NR-U PSCell addition/release

Recommended WF:

* Please discuss if Proposal 1a and Proposal 1b above can be agreed.

### Sub-topic 1-2 General configuration of the RRM tests

**Issue 1-2-1: SI decoding time**

During the last RAN4 meeting, a discussion regarding SI reading time was started for NR-U in the RRM core and RRM performance email threads. An agreement was reached in the RRM core and is reflected in the WF R4-2105700. Having in mind the agreement reached in RRM core, please consider how to proceed for the RRM performance with the following proposed options.

Candidate options:

* Option 1 ([R4-2109852](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109852.zip)): SI decoding time, TSI,CCA, is kept at 1280ms during RRC re-establishment and RRC release with re-direction in NR-U networks
* Option 2 ([R4-2111516](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111516.zip)): SI decoding time, TSI,CCA, is kept at 1280ms in NR-U test cases
	+ remove the following editor’s note from section 6.2.1A.2.1 of TS 38.133
		- *Editor’s note: The actual value for TSI-NR\_CCA is to be discussed in the performance part, considering LBT failures and receiver assumptions, etc.*

Recommended WF:

* Please clarify if there is a practical difference apart from the editor’s note issue between options 1 and 2, and discuss if option 2 can be agreed.

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub-topic 1-1 Applicability rulesIssue 1-1-1: How to handle legacy tests for UEs supporting only NR bands with CCA…Sub-topic 1-2 General configuration of the RRM testsIssue 1-2-1: SI decoding time… |
| Nokia | Sub-topic 1-1 Applicability rulesIssue 1-1-1: How to handle legacy tests for UEs supporting only NR bands with CCAWe agree with Proposal 1a,As for Proposal 1b, we would like to clarify with the proponent why that would that apply to Handover NR-U->NR(FR1). Wouldn’t such a device not be supposed to support NR?Additionally, the decision to include timing advance on the list should wait decision on Issue 3-5-1. Sub-topic 1-2 General configuration of the RRM testsIssue 1-2-1: SI decoding timeWe are fine with the intention of Options 1 and 2. It is to be clarified if Option 1 is already covering every topic covered in Option 2.  |
| MTK | Issue 1-1-1: We agree with Proposal 1a and 1b. In response to the comment from Nokia: “NR-U -> NR(FR1)” can be removed from the list, since the discussion is for UE supports only on NR band(s) with shared spectrum access. Issue 1-2-1:Both of Options 1 and 2 are fine. There are the same in our view. |
| Qualcomm | **Issue 1-2-1: SI decoding time**Support the proposals, both are same. |
| Huawei | **Issue 1-1-1:**Fine with proposal 1a and 1b with the clarification of MTK.**Issue 1-2-1:**Fine with option 1 and 2. |
| Ericsson | **Issue 1-1-1: How to handle legacy tests for UEs supporting only NR bands with CCA** We are fine with the proposal 1a and 1b. **Issue 1-2-1: SI decoding time**We are with option 1 and 2.  |

### CRs/TPs comments collection

|  |  |
| --- | --- |
| CR/TP number | Comments collection |
| **6.1.6.1** | **General** |
| [**R4-2110962**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110962.zip)**Ericsson****Draft CR** | **DraftCR 38.133 NR-U conditions** |
| Company A… |
| Company B… |
|  |
|  |
| [**R4-2110968**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110968.zip)**Ericsson****CR** | **CR 36.133 Correction of accuracy requirements for NR-U bands** |
| Company A… |
| Company B… |
|  |
| 6.1.6.2 | Measurement accuracy requirements |
| [**R4-2110326**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110326.zip)**Huawei****CR** | **CR on inter-RAT measurement accuracy for NR-U R16** |
| Ericsson: Already endorsed CR which is acceptable.  |
| Company B… |
|  |
|  |
| 6.1.6.3.1 | General |
| [**R4-2110781**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110781.zip)**Ericsson****Draft CR** | **Draft CR: Update of RMC for NR-U test cases** |
| Nokia:We are mostly fine with the CR, we have just a minor issue: should the Notes for the table being referred to in specific row(s), at least Note 1 ? |
| Company B… |
|  |
|  |
| 6.1.6.3.20 | Other |
| [**R4-2109278**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109278.zip)**Nokia****Draft CR** | **Requirement classification for statistical testing for TCs with CCA** |
| Ericsson: CR is acceptable to us.  |
| 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.*

|  |  |
| --- | --- |
|  | **Status summary**  |
| **Sub-topic#1-1** | Sub-topic 1-1 Applicability rulesIn this issue there was mostly agreement on Proposals 1a and 1b, with the exception of the test cases HO NR-U->NR(FR1) and Timing advance. Tentative agreements:* Add a note in each NR-U test case for verifying the legacy requirements as follows:
	+ In EN-DC test: The UE supporting EN-DC only on NR band(s) with shared spectrum access is required to be tested.
	+ In SA test: The UE supporting SA operation only on NR band(s) with shared spectrum access is required to be tested.
* Above the NR-U tests include:
	+ Handover
		- NR-U - > E-UTRAN (FDD,TDD)
	+ Legacy DCI/timer/RRC-based BWP switching on NR-U SCell
	+ Interruption
		- Due to inter-RAT SFTD measurements
		- Due to NR-U PSCell addition/release

Candidate options:* Option 1: Include Timing advance to the list
* Option 2: Not include Timing advance to the list

Recommendations for 2nd round:* Decide between Option 1 and 2 if Timing advance should be included based also on the outcome of Issue 3-5-1.
 |
| **Sub-topic#1-2** | Sub-topic 1-2 General configuration of the RRM testsIssue 1-2-1: SI decoding timeTentative agreements* SI decoding time, TSI,CCA, is kept at 1280ms during RRC re-establishment and RRC release with re-direction in NR-U networks
	+ remove the following editor’s note from section 6.2.1A.2.1 of TS 38.133
		- *Editor’s note: The actual value for TSI-NR\_CCA is to be discussed in the performance part, considering LBT failures and receiver assumptions, etc.*

Recommendations for 2nd round:* Tentative agreement is agreeable
 |

# Topic #2: CCA models

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

## Companies’ contributions summary

|  |  |  |  |
| --- | --- | --- | --- |
| T-doc number | Company | Proposals / Observations |  |
| [**R4-2109275**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109275.zip) | Nokia | On remaining details of NR-U RRM test configurationsObservation 1: For CCA success probability for LBE CCA model our preferred option is Option 2, i.e. P1 = P2 = 0.75. On the other hand, we would have no strong objection against Option 1 (P1 = 0.75, P2 = 0.5) if this is the preferred option in RAN4.Observation 2: RAN5 specify that at least 33 test runs are used for performance requirements with statistical nature.Observation 3: The minimum time interval used for most of the RRM tests is 200 ms.Observation 4: With PCCA\_DL =0.95 there is a 90% probability that more than 15 out of 33 test runs do not experience any LBT failure in a 200 ms time interval.Observation 5: With PCCA\_DL =0.9 there is a 10% probability that more than 15 out of 33 test runs do not experience any LBT failure in a 200 ms time interval.Observation 6: For CCA success probability for FBE CCA model, our preferred option to allow CCA failures to be tested with a larger likelihood during the test cases is Option 1, i.e. P = 0.9.Proposal 1: Define PCCA\_DL that results in a 90% probability that at least 15 out of 33 test runs will have one or more LBT failures in a 200 ms interval.Proposal 2: Define PCCA\_DL =0.9 for FBE.Observation 7: A high PCCA\_DL even when defined under high Es/Iot may reduce test coverage, since the probability of test runs to experience no LBT failure is larger.Proposal 3: Define PCCA\_DL independently of Es/Iot.Proposal 4: Define PCCA\_UL = 0.8 for both LBE and FBE modes.Observation 8: Unlimited UL CCA failures might result in UE states that are not typically verified in RRM tests.Proposal 5: Include limitation of the UL CCA failures LCCA\_UL on the UL CCA model.Observation 9: For deterministic (single run) test cases, PCCA would have to be very low if we want to assure that at least one CCA failure is experienced during the test.Proposal 6: Determine that TCs under CCA are subject to statistical testing. | Issue 2-1-1Issue 2-2-1Issue 2-1-2Issue 2-4-1Issue 2-3-2Issue 2-1-3 |
| [**R4-2111516**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111516.zip) | Qualcomm  | Remaining issues on RRM performance requirements Proposal 3: RAN4 to adopt the following CCA success probabilities for DL CCA model in typical test cases * For LBE: P1=0.75, P2=0.75,
* For FBE: P = 0.95

Proposal 4: RAN4 to adopt the following CCA success probabilities for UL CCA model in typical test cases * For LBE: P = 0.75
* For FBE: P = 0.95

  | Issue 2-2-1Issue 2-3-1 |
| [**R4-2108760**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2108760.zip) | ZTE | On CCA models and applicability rules in test cases for NR-U Observation 1: Wrong UE behaviors will impact other UEs, the overall system performance as well as other technologies using unlicensed bands such as WiFi.Proposal 1: Specifying one test case with UL CCA failure for each of the options 2a, 2b and 2c above.  | Issue 2-3-3 |
| [**R4-2111304**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111304.zip) | Ericsson | Analysis of open issues related to DL and UL CCA models Observation 1: Option 1 on CCA DL success probabilities is reasonable compromise between occurrence of sufficient number of DL CCA failures in the test case and the test time.Observation 2: CCA may be used in a test in a cell subject to CCA at any Es/Iot value.Observation 3: The test system cannot make any assumption about the discovery burst transmission windows in which the UE will measure in DRX or in non-DRX. Observation 4: In DRX the measurement period is longer but number of samples are in same order as in non-DRX so statistically the UE is likely to encounter similar number of CCA failures over the measurement periods with DRX and without DRX.Observation 5: In DRX the measurement period is longer but number of samples are in same order as in non-DRX. Therefore, statistically the UE is likely to encounter similar number of CCA failures over the measurement periods with DRX and without DRX.Proposal 1: We support option 1 for CCA DL success probabilities i.e.* For LBE: P1=0.75, P2=0.5,
* For FBE: P = 0.9

Proposal 2: CCA DL success probabilities are applicable to any value of Es/Iot.Proposal 3: The existing DL CCA model in non-DRX shall also apply when DRX is used.Proposal 4: In proposal 3, regardless of whether DRX is used or not, prior to each DBT window, the test equipment shall determine whether the CCA attempt is successful.Observation 6: Delay in CSI reporting due to UL CCA failure is less critical due to periodic CSI reporting.Observation 7: Delay in event triggered reporting due to UL CCA failure may be more challenging to verify due to lack of quantified delay requirement as function of UL CCA failure.Observation 8: HARQ delay has impact on scheduling is therefore more critical. Proposal 5: OCNG pattern is used for noise generation during the UL CCA detection time (TCCA) within the UL resources where the UE needs to assess the UL CCA.Proposal 6: During the UL CCA detection time the test equipment should generate energy level 3 dB above the energy detection threshold defined in TS 37.106.Proposal 7: Typical value of the successful UL CCA probability is 75%.Proposal 8: Verify the delay in sending HARQ feedback transmission under UL CCA failure in the MAC CE based TCI state switch delay test case. | Issue 2-2-1Issue 2-1-2Issue 2-2-2Issue 2-2-2Issue 2-3-4Issue 2-3-4Issue 2-3-1Issue 2-3-3 |

## Open issues summary

### Sub-topic 2-1 Principles for CCA models

**Issue 2-1-1: Principle for defining PCCA**

The probabilities for CCA success in DL have been discussed for the past 3 meetings, and one discussion paper proposes principles that can be used for guiding the decision on this test parameter. This has been generalised here in order to cover both UL and DL. Please consider the following Proposals regarding the underlying principle used to define PCCA.

Candidate proposal:

* Proposal 1: Define PCCA that results in a large percentage of test runs with one or more CCA failures in each phase of a test run where CCA failures are modelled.
	+ Proposal 1a ([R4-2109275](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109275.zip)): Define PCCA\_DL that results in a 90% probability that at least 15 out of 33 test runs will have one or more LBT failures in a 200 ms interval.
	+ Proposal 1b ([R4-2109282](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109282.zip)): Define PCCA\_UL probabilities that ensure that at least 15 out of 33 test runs experience more than one CCA failure.

Recommended WF:

* Please discuss if Proposal 1 with Proposal 1a and 1b can be agreed.

**Issue 2-1-2: PCCA dependency on Es/Iot**

During the last RAN4 meeting, it was pointed out that PCCA might be modelled differently depending on Es/Iot. Two discussion papers have proposals on that topic, that can be combined in Proposal 1a and 1b.

Candidate proposal:

* Proposal 1a ([R4-2109275](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109275.zip), [R4-2111304](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111304.zip)) CCA DL success probabilities are applicable to any value of Es/Iot.
* Proposal 1b: CCA UL success probabilities are applicable to any value of Es/Iot.

Recommended WF:

* Please discuss if Proposals 1a and 1b can be agreed.

**Issue 2-1-3: Requirement classification for statistical testing**

A discussion paper brought up the issue that for deterministic test cases under CCA, there might be a significant chance that some test runs do not experience any CCA failure. Having in mind that issue, please consider the following proposal:

Candidate proposal:

* Proposal 1 ([R4-2109275](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109275.zip)): Determine that TCs under CCA are subject to statistical testing.

Recommended WF:

* Please discuss if Proposal 1 can be agreed.

### Sub-topic 2-2 CCA models in DL

**Issue 2-2-1: CCA success probabilities for DL CCA model in typical test cases**

The probabilities for CCA success in DL have been discussed for the past 3 meetings, please consider the candidate options below, having in mind also the discussion on the basic principles of Sub-topic 2-1.

Candidate options:

* Option 1 ([R4-2111516](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111516.zip))
	+ For LBE: P1=0.75, P2=0.75
	+ For FBE: P = 0.95
* Option 2 ([R4-2109275](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109275.zip), [R4-2111304](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111304.zip))
	+ For LBE: P1=0.75, P2=0.5
	+ For FBE: P = 0.9
* Option 3 ([R4-2109275](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109275.zip))
	+ For LBE: P1=0.75, P2=0.75
	+ For FBE: P = 0.9

Recommended WF:

* Please consider which of the option above can be agreed having in mind the discussion on Issue 2-1-1.

**Issue 2-2-2 DRX CCA model**

Consider the following proposals regarding the applicability of existing DL CCA models when DRX is used:

Candidate proposals:

* Proposal 1 (R4-2111304): The existing DL CCA model in non-DRX shall also apply when DRX is used.
* Proposal 2 (R4-2111304): Regardless of whether DRX is used or not, prior to each DBT window, the test equipment shall determine whether the CCA attempt is successful.

Recommended WF:

* Please discuss if Proposals 1 and 2 can be agreed.

### Sub-topic 2-3 CCA models in UL

**Issue 2-3-1: CCA success probability in UL**

The UL CCA success probability has not been discussed openly during the last meeting. On that topic, 3 discussion papers bring proposals. Please consider which of these options can be agreed.

Candidate options:

* Option 1 ([R4-2109275](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109275.zip)): Define PCCA\_UL = 0.8 for both LBE and FBE modes.
* Option 2 ([R4-2111516](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111516.zip)): RAN4 to adopt the following CCA success probabilities for UL CCA model in typical test cases
	+ For LBE: P = 0.75
	+ For FBE: P = 0.95
* Option 3 (R4-2111304): Typical value of the successful UL CCA probability is 75%.

Recommended WF:

* Please discuss which of the options above can be agreed.

**Issue 2-3-2: Limitation of CCA failures in UL**

On the last RAN4 meetings Lmax was included for limiting the CCA failures in DL. However one of the discussion papers identified that the same might be necessary in the UL direction as well. Having that in mind, please consider the following proposal.

Candidate Proposal:

* Proposal 1 ([R4-2109275](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109275.zip)): Include limitation of the UL CCA failures LCCA\_UL on the UL CCA model.

Recommended WF:

* Please discuss if the proposal above can be agreed.

**Issue 2-3-3 Test case list to include UL CCA failures**

Consider the following proposal regarding the test case list to include UL CCA failures:

Candidate Proposal:

* Proposal 1 (R4-2108760): Specifying one test case with UL CCA failure for each of the cases below:
	+ Proposal 1a: SCell activation
		- Additional delay in transmission of CSI reporting due to CCA failure
	+ Proposal 1b: Event triggered measurement reporting delay
		- Additional delay due to UL LBT failure not defined
		- FFS: Assume it similar to above-mentioned SCell activation case
	+ Proposal 1c (R4-2111304): MAC CE based TCI state switch delay
		- Delay in sending HARQ feedback transmissions

Recommended WF:

* Please discuss if proposal 1 (with proposals 1a, 1b and 1c) can be agreed; if not, please discuss which of the proposal(s) 1a, 1b and 1c can be agreed.

**Issue 2-3-4 Noise pattern used for modeling UL CCA failures**

While defining the CCA model in UL during the last RAN4 meeting, it was discussed whether the OCNG is also applicable for generating CCA failures in UL. Considering the open issues regarding noise pattern for modeling UL CCA failures, consider the following proposals:

Candidate Proposals:

* Proposal 1 (R4-2111304): OCNG pattern is used for noise generation during the UL CCA detection time (TCCA) within the UL resources where the UE needs to assess the UL CCA.
* Proposal 2 (R4-2111304): During the UL CCA detection time the test equipment should generate energy level 3 dB above the energy detection threshold defined in TS 37.106.

Recommended WF:

* Considering that the issue regarding OCNG was already brought during the last meeting, it is proposed to agree with both proposals 1 and 2.

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub-topic 2-1 Principles for CCA modelsIssue 2-1-1: Principle for defining PCCA…Issue 2-1-2: PCCA dependency on Es/Iot…Issue 2-1-3: Requirement classification for statistical testing…Sub-topic 2-2 CCA models in DLIssue 2-2-1: CCA success probabilities for DL CCA model in typical test cases…Issue 2-2-2 DRX CCA model…Sub-topic 2-3 CCA models in ULIssue 2-3-1: CCA success probability in UL…Issue 2-3-2: Limitation of CCA failures in UL…Issue 2-3-3 Test case list to include UL CCA failures…Issue 2-3-4 Noise pattern used for modeling UL CCA failures… |
| Nokia | Sub-topic 2-1 Principles for CCA modelsIssue 2-1-1: Principle for defining PCCAWe agree with Proposal 1, 1a and 1b.We believe that the PCCA should be defined such that most of the test runs have at least 1 CCA failure. The time of 200 ms on proposal 1a comes from the fact that most of the existing NR test cases have intervals that are larger than 200 ms, so if there is usually one LBT failure withing that 200 ms interval there will be a good test coverage. As an example, if we have a test case with 3 intervals T1=1 s, T2=200ms, T3 = 5s, we would like to have PCCA such that there is a good chance of one LBT failure on this interval T2. Issue 2-1-2: PCCA dependency on Es/IotWe agree with Proposals 1a and 1b.We believe that Proposal 1 is also in line with Proposal 1 in 2-1-1, and it guarantees that the PCCA is defined to guarantee a good test coverage, meaning that PCCA is defined such that most test runs have some LBT failures. Issue 2-1-3: Requirement classification for statistical testingWe support Proposal 1. In order to clarify that proposal, we would like to highlight that the classification of statistical testing determines the impact of the tests in RAN5. For requirements with statistical nature the tests are run at least 33 times as described in RAN5 spec 38.533 in case of no error. If we do not define something like that there is a chance that most of the “deterministic” requirements are very rarely affected by CCA failures, since they are run only once. The alternative to that proposal would be to define a fairly low PCCA, which is not the direction the discussions have been heading so far.We think it is important to define clearly that all TCs under CCA are subject to statistical testing. The reason for that is that if a test case using CCA is considered as deterministic, we would need to define a very low PCCA to guarantee that there are at least few CCA failures on a test run. Sub-topic 2-2 CCA models in DLIssue 2-2-1: CCA success probabilities for DL CCA model in typical test casesOur preference is option 3, but we may compromise with option 2. We have strong concerns with Option 1 related to P(FBE) = 0.95; as shown in our contribution R4-2109275 with such value does not allow a good test coverage with DL CCA failures. With P=0.95 there is a large chance that most of the test runs do not experience any CCA failure, and that would question how effective that test case is on verifying the behaviour under CCA. Issue 2-2-2 DRX CCA modelWe are fine with proposals 1 and 2. Sub-topic 2-3 CCA models in ULIssue 2-3-1: CCA success probability in ULWe agree with proposal 1, but we may agree with proposal 3, assuming that such proposal is valid for both LBE and FBE modes. As in issue 2-2-1 and for the same reason we have strong concerns with Option 2 related to P(FBE) = 0.95 since it would mean that most test runs do not experience LBT failure in UL. With this large probability the test case with CCA would be basically the same as the existing NR test case. P(LBE) = 0.75 is fine for us.Issue 2-3-2: Limitation of CCA failures in ULWe agree with Proposal 1.Taking the Random Access test case as an example, this limitation of LCCA\_UL is important to guarantee that the UE doesn’t reach a state of unsuccessful completion of RACH procedure due to UL LBT failures. Issue 2-3-3 Test case list to include UL CCA failuresNo strong views. Issue 2-3-4 Noise pattern used for modeling UL CCA failuresWe agree with both proposals 1 and 2. |
| MTK | Issue 2-2-1: Our preference is option 3. P1=P2 is more realistic in our view. |
| Qualcomm | **Issue 2-1-1: Principle for defining PCCA**Do not agree with proposal 1. We have strong concerns over such a general approach for all scenarios.The test set-up should be designed to ensure a UE’s functionality in a typical environment. The requirement of NR-U are defined keeping in mind that most of the transmissions would be successful with occasional LBT failures and that the UE should be able to handle such LBT failures. That is also one of the reason that a limit on the max number of LBT failures allowed has been imposed on most of the RRM requirements. Having almost half the test cases encounter at-least one LBT failure with a high probability may not be the right approach for all the deployment scenarios. For instance, FBE is typically deployed in an IIoT kind of setting, where the operator guarantees no external interference from other technologies, e.g. WiFi, BT etc. In such a setting, the gNB takes control over the network and contends for the COT in a well-coordinated fashion, operating almost as in a licensed spectrum. So there are negligible chances of having an LBT failure in such a system. The devices dedicated to operate in such environment may be optimized to handle extremely low LBT failures. Testing such devices under the scenarios where they are not intended to operate is not justified. Furthermore, only gNB contends for the COT in a semi-static environment and the UE shares the gNB occupied COT. This further reduces the probability of UL CCA failures.So this approach of having half of the test-cases undergo atleast one CCA failure is not applicable to all scenarios, **certainly not to FBE devices**. **Issue 2-1-2: PCCA dependency on Es/Iot**Can agree with proposal 1a and 1b**Issue 2-1-3: Requirement classification for statistical testing**We are fine with the proposal as long as our concerns under issue 2-1-1 are addressed.**Issue 2-2-1: CCA success probabilities for DL CCA model in typical test cases**Support option 1. We are fine with P1=0.75, P2=0.75 for LBE but for FBE, P<0.95 is not acceptable to us. Furthermore, P1=0.75, P2=0.75 gives an overall LBT success rate of 93.75 for LBE, so it makes perfect sense to keep P(FBE) = 0.95.**Issue 2-2-2 DRX CCA model**Fine with the approach in general but given that we’ve agreed that for most of the RRM requirements, a UE is not required to determine the availability of SSB more frequent than once in a DRX cycle, it should be specified in the model to take that into account while testing a requirement involving DRX.**Issue 2-3-1: CCA success probability in UL**Support option 2. For option 1, we are fine with PCCA\_UL = 0.8 for LBE but how can UL LBT failure rate be so high for FBE mode. There is literally zero probability of UL LBT failures in FBE mode. Please consider the deployment scenario in your evaluations.**Issue 2-3-2: Limitation of CCA failures in UL**We are fine with the proposal**Issue 2-3-3 Test case list to include UL CCA failures**Maybe we can avoid these test-cases as they don’t really add much value and add unnecessary burden to the list of test-cases**Issue 2-3-4 Noise pattern used for modeling UL CCA failures**We are fine with the proposals |
| Huawei | **Issue 2-1-3: Requirement classification for statistical testing**We can understand the motivation from the explainasion of proponent company, but the changes are quite general. Is it only a guidance for RAN5 to define statistical testing? |
| Moderator (Nokia) | **Agreements from the GTW on the 20th of May**Sub-topic 2-1 Principles for CCA modelsIssue 2-1-2: PCCA dependency on Es/Iot* + Agreements:
		- CCA DL success probabilities are applicable to any value of Es/Iot.
		- CCA UL success probabilities are applicable to any value of Es/Iot.

Sub-topic 2-2 CCA models in DLIssue 2-2-1: CCA success probabilities for DL CCA model in typical test cases* + Agreements:
		- For LBE: P1 = 0.75, P2 = 0.75
		- For FBE: P = 0.9375

Issue 2-2-2 DRX CCA model* + Agreements:
		- The existing DL CCA model in non-DRX shall also apply when DRX is used.
		- Regardless of whether DRX is used or not, prior to each DBT window, the test equipment shall determine whether the CCA attempt is successful.

Sub-topic 2-3 CCA models in ULIssue 2-3-1: CCA success probability in UL* + Agreements:
		- RAN4 to adopt the following CCA success probabilities for UL CCA model in typical test cases
			* For LBE: P = 0.75
			* For FBE:
				+ Option 1: P = 0.8
				+ Option 2: P = 0.9375
				+ FFS whether and how option 2 can ensure statistical reliability of UL requirements testing

Issue 2-3-2: Limitation of CCA failures in UL* + Agreements:
		- Include limitation of the UL CCA failures LCCA\_UL on the UL CCA model.

Issue 2-3-3 Test case list to include UL CCA failures* + Agreements:
		- FFS: Define “MAC CE based TCI state switch delay” test case with UL CCA failure

Issue 2-3-4 Noise pattern used for modeling UL CCA failures* + Agreements:
		- OCNG pattern is used for noise generation during the UL CCA detection time (TCCA) within the UL resources where the UE needs to assess the UL CCA.
		- During the UL CCA detection time the test equipment should generate energy level 3 dB above the energy detection threshold defined in TS 37.106.
 |
| ZTE | 2-3-1: We prefer Option 1 which is P = 0.8. P = 0.9375 seems too many digits here, what will happen with the tests? Does it mean that the tests will be run for sufficient (too many) times? |
| Ericsson | **Issue 2-1-1: Principle for defining PCCA**Follow the agreement from issue 2-2-1 as agreed in GTW. **Issue 2-1-2: PCCA dependency on Es/Iot**Already agreed in GTW.**Issue 2-2-1: CCA success probabilities for DL CCA model in typical test cases**Already agreed in GTW.**Issue 2-2-2 DRX CCA model**Follow the agreement from GTW.**Issue 2-3-1: CCA success probability in UL**Follow the agreement from GTW.**Issue 2-3-2: Limitation of CCA failures in UL**Follow the agreement from GTW.**Issue 2-3-3 Test case list to include UL CCA failures**Confirm the agreement from GTW.**Issue 2-3-4 Noise pattern used for modeling UL CCA failures**Follow the agreement from GTW. |
| Nokia(2nd reply) | Sub-topic 2-1 Principles for CCA modelsIssue 2-1-3: Requirement classification for statistical testingAfter our GTW session, I would like to clarify further how this proposal could be implemented, and how it is impacting the specs. We have brought a CR R4-2109278, which has a new clause to be added as part of clause A2 of 38.133:* A.2 Requirement classification for statistical testing

which serves as a guide for what is defined as statistic or deterministic tests in RAN5. If you take for example Tagle C.2.6-1 of 38.533, the tests below are considered as deterministic: * EN-DC with all NR cells in FR1
	+ 4.3.2.2 Random access
	+ 4.4.1UE transmit timing
* EN-DC with at least one NR cell in FR2
	+ 5.3.2.2 Random access
	+ 5.4.1 UE transmit timing
* NR standalone in FR1
	+ 6.3.2.2 Random access
	+ 6.4.1 UE transmit timing
* NR standalone with at least one NR cell in FR2
	+ 7.3.2.2 Random access
	+ 7.4.1 UE transmit timing

Therefore, by addming this to the RRM performance requirements in 38.133 we avoid any uncertainty on how the requirements with CCA are classified. Also according to our analysis, if we don’t do this classification, we would end up needing to have much lower PCCA values to ensure that our tests are meaningful. Sub-topic 2-3 CCA models in ULIssue 2-3-1: CCA success probability in ULWe support P=0.8 for FBEWe would like to reiterate our opinion that it is important to have a probability of CCA failures that help us ensuring the test coverage. We have provided statistical analysis in our paper [R4-2109282](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109282.zip) on random access test cases which show that anything hight than 0.8 is not enough for testing appropriately the random access TC.  |
|  |  |

### CRs/TPs comments collection

|  |  |
| --- | --- |
| CR/TP number | Comments collection |
| 6.1.6.3.1 | General |
| [**R4-2109276**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109276.zip)**Nokia****Draft CR** | **Draft CR on CCA model for NR-U** |
| Ericsson: Agree that this CR and [R4-2111305](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111305.zip) can be merged. The current version of [R4-2109276](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109276.zip) does not contain the changes proposed in [R4-2111305](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111305.zip). |
| Company B… |
|  |
|  |
| 6.1.6.3.20 | Other |
| [**R4-2111305**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111305.zip)**Ericsson****Draft CR** | **Correction to DL/UL CCA models in 38.133** |
| NokiaThis CR has a text proposal for some improvements that are worth taking into account. In our opinion, we would prefer to take the implementation part of the Lmax as in the proposed text in R4-2109276 for both DL and UL, since for DL (the UL case is not addressed by R4-2111305) it is more explicit on the parameters to be configured, i.e. L\_CCA\_DL and W\_CCA\_DL which can also be used in other cases where something like Lmax need to be defined in order to guarantee proper behavior of the test but there is no Lmax specification on the core requirements.We propose that we merge both this CR and R4-2109276 taking into account the comments above. |
| 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.*

|  |  |
| --- | --- |
|  | **Status summary**  |
|  |  |
| **Sub-topic#2-1** | Sub-topic 2-1 Principles for CCA modelsIssue 2-1-1: Principle for defining PCCAIn this issue, we could not reach an agreement during the GTW session. Since it is not essencial issue, but rather a guiding principle for choosing other requirements, we propose to focus on concluding the discussion on Issue 2-3-1. Recommendations for 2nd round:* Since there were more agreements on the issues 2-2-1 and 2-3-1, focus on the remaining parts of 2-3-1.

Issue 2-1-2: PCCA dependency on Es/Iot* + Agreements:
		- CCA DL success probabilities are applicable to any value of Es/Iot.
		- CCA UL success probabilities are applicable to any value of Es/Iot.

Issue 2-1-3: Requirement classification for statistical testingDuring the GTW no conclusion was reached and session chair suggested to continue discussion whether RAN4 can add specific clarifications on statistical testing and provide information to RAN5. Candidate options:* Option 1: Determine that TCs under CCA with 0 < PCCA <1 are subject to statistical testing.
	+ Send LS to inform RAN5 about the RAN4 decision.
* Option 2: Send LS to RAN5 with question(s) and an action for RAN5 to answer.

Recommendations for 2nd round:* Discuss your preferences between Option 1 and 2.
 |
| **Sub-topic#2-2** | Sub-topic 2-2 CCA models in DLIssue 2-2-1: CCA success probabilities for DL CCA model in typical test cases* + Agreements:
		- For LBE: P1 = 0.75, P2 = 0.75
		- For FBE: P = 0.9375

Issue 2-2-2 DRX CCA model* + Agreements:
		- The existing DL CCA model in non-DRX shall also apply when DRX is used.
		- Regardless of whether DRX is used or not, prior to each DBT window, the test equipment shall determine whether the CCA attempt is successful.
 |
| **Sub-topic#2-3** | Sub-topic 2-3 CCA models in ULIssue 2-3-1: CCA success probability in UL* + Agreements:
		- RAN4 to adopt the following CCA success probabilities for UL CCA model in typical test cases
			* For LBE: P = 0.75
			* For FBE:
				+ Option 1: P = 0.8
				+ Option 2: P = 0.9375
				+ FFS whether and how option 2 can ensure statistical reliability of UL requirements testing

Candidate options:* Option 1: PCCA\_UL = 0.8
* Option 2: PCCA\_UL = 0.9375

Recommendations for 2nd round:* Discuss your preferences between Option 1 and 2. For Option 2, please discuss how to ensure statistical reliability of UL requirements.

Issue 2-3-2: Limitation of CCA failures in UL* + Agreements:
		- Include limitation of the UL CCA failures LCCA\_UL on the UL CCA model.

Issue 2-3-3 Test case list to include UL CCA failures* + Agreements:
		- FFS: Define “MAC CE based TCI state switch delay” test case with UL CCA failure

Issue 2-3-4 Noise pattern used for modeling UL CCA failures* + Agreements:
		- OCNG pattern is used for noise generation during the UL CCA detection time (TCCA) within the UL resources where the UE needs to assess the UL CCA.
		- During the UL CCA detection time the test equipment should generate energy level 3 dB above the energy detection threshold defined in TS 37.106.
 |

### 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)

*Moderator can provide summary of 2nd round here. Note that recommended decisions on tdocs should be provided in the section titled ”Recommendations for Tdocs”.*

# Topic #3: Test case specific details

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

## Companies’ contributions summary

|  |  |  |  |
| --- | --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |  |
| 6.1.6.3.2 |   | RRC IDLE cell re-selection |  |
| [R4-2108772](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2108772.zip) | ZTE | Remianing issues on RRC IDLE cell re-selection tests in NR-U Observation 1: Some UEs may support only NR-U and E-UTRAN but not NR in licensed mode.Proposal 1: Define separate tests for the test cases mentioned in Options 1a and 1b.  | Issue 3-1-1 |
| 6.1.6.3.3 |   | HO (delay and interruptions) |  |
| [R4-2108773](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2108773.zip) | ZTE | Remianing issues on handover tests in NR-U Observation 1: Some UEs may support only NR-U and E-UTRAN but not NR in licensed mode.Proposal 1: Specify test cases to verify correct UE behavior for all scenarios: E-UTRAN (FDD,TDD)->NR-U, NR-U -> E-UTRAN (FDD,TDD), NR(FR1) -> NR-U and NR-U -> NR(FR1).  | Issue 3-2-1 |
| [R4-2110328](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110328.zip) | Huawei, HiSilicon | Discussion on HO test cases for NR-U Observation 1: L3 shall be considered in Handover test cases as it is agreed that the addition delay in acquiring the PRACH resource due to UL LBT failure should be defined in handover test cases.Proposal 1: Configure PCCA\_UL as 0.75 to model the addition delay in acquiring the PRACH resource.Observation 2: TE is not able to avoid invalid handover test cases when T304 expires due to extension of LBT as there is not specific restrictions on number of L defined in the core requirements.Proposal 2: Add a note in handover test cases to clarify that A test will not be considered in the statistics when T304 times expires considering the time extensions cause by L1, L1´, L2 , L3.  | Issue 3-2-2Issue 3-2-3 |
| 6.1.6.3.4 |   | RRC Re-establishment |  |
| 6.1.6.3.5 |   | RRC Connection Release with Redirection |  |
| [R4-2111306](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111306.zip) | Ericsson | RRC re-establishment tests from NR to NR-U Proposal 1: At least the following NR to NR-U RRC re-establishment tests to verify core requirements in clause 6.2.1A, TS 38.133, are defined:1. TC1: Intra-frequency RRC Re-establishment in FR1 with serving cell without CCA and known target cell subject to CCA
2. TC2: Inter-frequency RRC Re-establishment in FR1 with serving cell without CCA and with unknown target cell subject to CCA
3. TC3: Intra-frequency RRC Re-establishment in FR1 with serving cell without CCA, with unknown target cell subject to CCA and without serving cell timing.

Proposal 2: NR to NR-U RRC re-establishment tests are defined for the following configuration related to SSB SCS and BW for both serving and target cells:

|  |  |  |
| --- | --- | --- |
| Configuration | Source cell without CCA | Target cell with CCA |
| 1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD | 30 kHz SSB SCS, 40 MHz bandwidth, TDD |
| 2 | 15 kHz SSB SCS, 10 MHz bandwidth, TDD | 30 kHz SSB SCS, 40 MHz bandwidth, TDD |
| 3 | 30 kHz SSB SCS, 40 MHz bandwidth, TDD | 30 kHz SSB SCS, 40 MHz bandwidth, TDD |
| Note: The UE is only required to be tested in one of the supported test configurations |

Proposal 3: In the test under the following parameter settings (non-DRX, no gaps are used and SSB periodicity is 20 ms), the out of sync detection evaluation period = 480 ms when the serving cell is inactivated (RLM-RS SSB Es/Iot <-7 dB).Proposal 4: NR to NR-U RRC re-establishment tests can be defined for the following DL LBT configuration/setting in the target cell during T3 (when UE detects the target cell):* + For LBE: PCCA\_DL\_1 =0.75, PCCA\_DL\_2 =0.5
	+ For FBE: PCCA\_DL= 0.9

Proposal 5: UL LBT is not enabled in the target cell i.e. PCCA\_UL =1 in all test times. | Issue 3-3-1Issue 3-3-2Issue 3-3-3Issue 3-3-4Issue 3-3-5 |
| 6.1.6.3.6 |   | Random access |  |
| [R4-2108774](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2108774.zip) | ZTE Corporation | Remianing issues on random access tests in NR-U Proposal 1: NR-U random access procedure tests do not need to configure DL LBT failure, i.e., set PCCA\_DL=1.0.Proposal 2: Test equipment to configure *preambleReceivedTargetPower* for msg1 and *msgA-PreambleReceivedTargetPower* for msgA to the highest value for UL LBT test cases. | Issue 3-4-2Issue 3-4-3 |
| [R4-2109282](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109282.zip) | Nokia, Nokia Shanghai Bell | Discussion on Random access TC parameters  Observation 1: Random access test cases were included on the list among the TCs that are used to differentiate LBE and FBE behaviour of UEs supporting both channel access modes.Observation 2: If DL CCA failures are not configured in random access test cases, there will be nearly no difference on the test case when configured with LBE and FBE.Proposal 1: Define configuration of random access test cases that help differentiating the UE behaviour when configured with semi-static and dynamic channel access modes.Proposal 2: Configure DL CCA failures for the random access test cases for both semi-static and dynamic channel access configurations.Observation 3: Random access procedure is considered unsuccessfully completed after the combination of retransmissions and UL LBT failures exceed preambleTransMax.Observation 4: Random access test cases always include 5 transmissions of the preamble. RAR/MsgB retransmissions may be delayed following DL CCA failures, but in any case the Response Window duration must not be exceeded to avoid further PRACH/MsgA retransmissions.Proposal 3: Define random access test cases that limit the number of CCA failures in UL and DL to prevent reaching preambleTransMax LBE and FBE configurations.Proposal 4: Define preambleTransMax, LCCA\_DL and LCCA\_UL in random access test cases with CCA such that preambleTransMax > 5 + LCCA\_DL +LCCA\_UL LBE and FBE configurationsProposal 5: Define preambleTransMax = n20, LCCA\_DL =4 and LCCA\_UL =5 in random access test cases with CCA for both LBE and FBE configurations.Observation 5: If a single test run is considered with 5 retransmissions, there is a high probability of no CCA failures for PCCA>0.75.Proposal 6: Define that random access test cases are subject to statistical testing.Observation 6: RAN5 requirements for statistical testing include at least 33 test runs if no errors are observed.Proposal 7: Define PCCA probabilities that ensure that at least 15 out of 33 test runs experience more than one CCA failure.Observation 7: Assuming statistical testing is used for random access TCs, the conditions PCCA\_DL ≤ 0.8 and PCCA\_UL ≤ 0.8 are mandatory to ensure that at least 15 out of 33 test runs experience at least one CCA failure with a 96% probability.Proposal 8: Define PCCA\_UL = 0.8 for both LBE and FBE modes in random access test cases.Proposal 9: Define PCCA\_DL = 0.8 for FBE mode in random access test cases. | Issue 3-4-1Issue 3-4-2Issue 3-4-4Issue 3-4-4Issue 3-4-4Issue 3-4-5Issue 3-4-6Issue 3-4-6Issue 3-4-6 |
| 6.1.6.3.7 |   | Timing (transmit timing and TA) |  |
| [R4-2108770](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2108770.zip) | ZTE  | Discussion on test cases for timing in NR-U Proposal 1: UE timing advance adjustment accuracy tests are defined for the following LBT configuration/setting in SpCell: PCCA\_UL=1 and PCCA\_DL =1 in all test times. | Issue 3-5-1 |
| 6.1.6.3.8 |   | BWP switching delay and interruptions |  |
| [R4-2108775](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2108775.zip) | ZTE  | Remianing issues on tests for BWP switch in NR-U Proposal 1: Endorse the configurations in the WF [1]:

|  |  |  |
| --- | --- | --- |
| Active BWP in SpCell  | PCCA\_UL | PCCA\_DL |
| UL active BWP before active BWP switching (UL BWP-1) | 0 | 1 |
| UL active BWP after active BWP switching (UL BWP-2) | 1 | 1 |
| DL active BWP before active BWP switching (DL BWP-1) | 1 | 1 |
| DL active BWP after active BWP switching (DL BWP-2) | 1 | 1 |

 | Issue 3-6-1 |
| 6.1.6.3.9 |   | PSCell addition/release (delay and interruption) |  |
| 6.1.6.3.10 |   | SCell activation/deactivation (delay and interruption) |  |
| 6.1.6.3.11 |   | Other interruptions |  |
| 6.1.6.3.13 |   | Beam management (BFD and link recovery) |  |
| [R4-2108776](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2108776.zip) | ZTE  | On test cases for beam management in NR-U  Proposal 1: Agree on Option 1 in the WF [1].* Option 1: Set the CCA parameters in the link recovery tests for NR-U as follows. For DL LBT parameters, RAN4 should wait for the conclusion of CCA models for NR-U RRM performance requirements.

**CCA parameters in link recovery tests for NR-U**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | T1 | T2 | T3 | T4 | T5 |
| PCCA,DL | semi-static channel access | 1.0 | FFS | FFS | FFS | FFS |
| dynamic channel access | 1.0 | FFS | FFS | FFS | FFS |
| PCCA,UL |  | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |

 | Issue 3-7-1 |
| [R4-2110651](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110651.zip) | Ericsson | Open issues on link recovery and L1-RSRP reporting test cases for NR-U Proposal 1: Set PCCA\_UL=1.0 (no UL CCA failures) for link recovery tests. Proposal 2: Set PCCA\_UL=1.0 (no UL CCA failures) for L1-RSRP measurement reporting tests. Proposal 3: For DL CCA success probabilities of link recovery and L1-RSRP reporting test cases, wait for the conclusion of the general principles of CCA modelling and the default probabilities. Proposal 4: For the link recovery and L1-RSRP reporting tests with dynamic channel access configuration, configure two DL CCA probabilities: PDL,CCA,1 for the 1st SSB candidate position and PDL,CCA,2 for the 2nd SSB candidate position.  | Issue 3-7-1Issue 3-7-1Issue 3-7-1Issue 3-7-1 |
| 6.1.6.3.14 |   | SS-RSRP/SS-RSRQ/SS-SINR/L1-RSRP measurement procedure (intra-frequency, inter-frequency, inter-RAT) |  |
| 6.1.6.3.16 |   | SFTD measurement procedure |  |
| 6.1.6.3.17 |   | SS-RSRP/SS-RSRQ/SS-SINR/L1-RSRP measurement accuracy (intra-frequency, inter-frequency, inter-RAT) |  |
| [R4-2111244](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111244.zip) | Ericsson | Discussions on RSRP/RSRQ measurement accuracy test for NR-U in EN-DC Proposal 1: NR-U RSRP and RSRQ measurement accuracy test cases are designed for following cases:* Intra-frequency RSRP measurement accuracy
* Inter-frequency RSRP measurement accuracy
* Intra-frequency RSRQ measurement accuracy
* Inter-frequency RSRQ measurement accuracy

Proposal 2: NR-U RSRP and RSRQ measurement accuracy test cases are designed for following test configuration:

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations in each supported band |

Proposal 3: Cell specific test parameters should contain following new or modified parameters to account for the LBT impact:* DL CCA model
* UL CCA model
* DBT Window Configuration
* DL CCA probability PCCA\_DL
* UL CCA probability PCCA\_UL
* SSB configuration
* New RMCs
 | Issue 3-8-1Issue 3-8-2Issue 3-8-2 |
| 6.1.6.3.18 |   | RSSI/CO measurement accuracy (intra-frequency, inter-frequency, inter-RAT) |  |
| 6.1.6.3.19 |   | SFTD measurement accuracy |  |
| 6.1.6.3.20 |   | Other |  |
| [R4-2108777](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2108777.zip) | ZTE  | On test cases for TCI state switch in NR-U Proposal 1: Introduce the timing difference between the RS in the two TCI states in the TCI state switching test cases, where the exact value needs further discussion.Proposal 2: Confirm on the testability on Option 1. | Issue 3-9-1Issue 3-9-1 |

## Open issues summary

### Sub-topic 3-1: RRC IDLE cell re-selection

**Issue 3-1-1: How to introduce RRC IDDLE cell re-selection test cases**

This issue was discussed on the last RAN4 meeting, and one DP brought a proposal on the topic. Please consider the proposal below.

Candidate proposal:

* Proposal 1 (R4-2108772): Define separate tests for the test cases below:
	+ Cell reselection for E-UTRAN (FDD,TDD)->NR-U and NR-U -> E-UTRAN (FDD,TDD).
	+ Cell reselection for NR(FR1) -> NR-U and NR-U -> NR(FR1).

Recommended WF:

* During the last RAN4 meeting most of the companies had opinions in favour of Proposal 1. Can we agree on Proposal 1?

### Sub-topic 3-2: HO (delay and interruptions)

**Issue 3-2-1: HO scenarios**

Candidate proposals/options:

* Proposal 1 (R4-2108773): Specify test cases to verify correct UE behavior for all scenarios:
	+ E-UTRAN (FDD,TDD)->NR-U,
	+ NR-U -> E-UTRAN (FDD,TDD),
	+ NR(FR1) -> NR-U
	+ NR-U -> NR(FR1).

Recommended WF:

* During the last RAN4 meeting most of the companies had opinions in favour of Proposal 1. Can we agree on Proposal 1?

**Issue 3-2-2: HO CCA success probability in UL**

CCA success probability in UL is discussed here as well as in Topic #2. It should be decided if this probability should be defined specifically for HO or if it is enough to discuss that in a general way under Topic #2

Candidate options:

* Proposal 1 (R4-2110328): Configure PCCA\_UL as 0.75 to model the addition delay in acquiring the PRACH resource.

Recommended WF:

* Considering that Issue 2-3-1 discusses PCCA\_UL in a general way, it is recommended to focus the discussion of probabilities in the general case during the 1st round, and wait for the decision on PCCA\_UL in Issue 2-3-1 before discussing if a specific value for the HO TC is needed.

**Issue 3-2-3: HO test behaviour after T304 expires**

Candidate proposals/options:

* Proposal 1 (R4-2110328): Add a note in handover test cases to clarify that A test will not be considered in the statistics when T304 times expires considering the time extensions cause by L1, L1´, L2 , L3.

Recommended WF:

* Please discuss if Proposal 1 can be agreed?

### Sub-topic 3-3: RRC Re-establishment

**Issue 3-3-1: RRC re-establishment tests cases**

Considering the test cases list for RRC re-establishment, R4-2111306 brought the following proposal regarding new TCs to be included for RRC re-establishment with CCA.

Candidate proposals:

* Proposal 1 (R4-2111306): At least the following NR to NR-U RRC re-establishment tests to verify core requirements in clause 6.2.1A, TS 38.133, are defined:
	+ TC1: Intra-frequency RRC Re-establishment in FR1 with serving cell without CCA and known target cell subject to CCA
	+ TC2: Inter-frequency RRC Re-establishment in FR1 with serving cell without CCA and with unknown target cell subject to CCA
	+ TC3: Intra-frequency RRC Re-establishment in FR1 with serving cell without CCA, with unknown target cell subject to CCA and without serving cell timing.

Recommended WF:

* Can we agree on Proposal 1?

**Issue 3-3-2: RRC re-establishment configurations**

Candidate proposals/options:

* Proposal 1 (R4-2111306): NR to NR-U RRC re-establishment tests are defined for the following configuration related to SSB SCS and BW for both serving and target cells:

|  |  |  |
| --- | --- | --- |
| Configuration | Source cell without CCA | Target cell with CCA |
| 1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD | 30 kHz SSB SCS, 40 MHz bandwidth, TDD |
| 2 | 15 kHz SSB SCS, 10 MHz bandwidth, TDD | 30 kHz SSB SCS, 40 MHz bandwidth, TDD |
| 3 | 30 kHz SSB SCS, 40 MHz bandwidth, TDD | 30 kHz SSB SCS, 40 MHz bandwidth, TDD |
| Note: The UE is only required to be tested in one of the supported test configurations |

Recommended WF:

* Can we agree on Proposal 1?

**Issue 3-3-3: Out of sync detection evaluation period in tests with CCA**

Candidate proposals/options:

* Proposal 1 (R4-2111306): In the test under the following parameter settings (non-DRX, no gaps are used and SSB periodicity is 20 ms), the out of sync detection evaluation period = 480 ms when the serving cell is inactivated (RLM-RS SSB Es/Iot <-7 dB).

Recommended WF:

* Can we agree on Proposal 1?

**Issue 3-3-4: CCA probabilities for RRC re-establishment test cases in DL**

Candidate proposals/options:

* Proposal 1 (R4-2111306): NR to NR-U RRC re-establishment tests can be defined for the following DL LBT configuration/setting in the target cell during T3 (when UE detects the target cell):
	+ For LBE: PCCA\_DL\_1 =0.75, PCCA\_DL\_2 =0.5
	+ For FBE: PCCA\_DL= 0.9

Recommended WF:

* Please consider if these probabilities have to be discussed in this issue, or if it is enough to discuss them under Topic #2.

**Issue 3-3-5: CCA probabilities for RRC re-establishment test cases in UL**

Candidate proposals/options:

* Proposal 1 (R4-2111306): UL LBT is not enabled in the target cell i.e. PCCA\_UL =1 in all test times.

Recommended WF:

* Can we agree on Proposal 1?

### Sub-topic 3-4: Random access

**Issue 3-4-1: Differentiation of FBE and LBE configurations in random access test cases**

Candidate proposals/options:

* Proposal 1 ([R4-2109282](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109282.zip)): Define configuration of random access test cases that help differentiating the UE behaviour when configured with semi-static and dynamic channel access modes.

Recommended WF:

* Please discuss if proposal 1 can be agreed.

**Issue 3-4-2: Configuration of DL CCA for random access test cases**

Candidate options:

* Option 1 (R4-2108774): NR-U random access procedure tests do not need to configure DL LBT failure, i.e., set PCCA\_DL=1.0.
* Option 2 ([R4-2109282](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109282.zip)): Configure DL CCA failures for the random access test cases for semi-static channel access configuration.

Recommended WF:

* Please discuss which option can be agreed.

**Issue 3-4-3: Preamble received target power configuration**

Candidate proposals/options:

* Proposal 1 (R4-2108774): Test equipment to configure *preambleReceivedTargetPower* for msg1 and *msgA-PreambleReceivedTargetPower* for msgA to the highest value for UL LBT test cases.

Recommended WF:

* Please discuss if proposal 1 can be agreed.

**Issue 3-4-4: Limitation of CCA failures in UL for random access TCs**

This issue is also related to Issue 2-3-2, where this limitation is discussed in the general sense.

Candidate proposals/options:

* Proposal 1 ([R4-2109282](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109282.zip)): Define random access test cases that limit the number of CCA failures in UL and DL to prevent reaching preambleTransMax for both LBE and FBE configurations.
* Proposal 2 ([R4-2109282](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109282.zip)): Define preambleTransMax, LCCA\_DL and LCCA\_UL in random access test cases with CCA such that preambleTransMax > 5 + L LCCA\_DL + LCCA\_UL for both LBE and FBE configurations
* Proposal 3 ([R4-2109282](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109282.zip)): Define preambleTransMax = n20, LCCA\_DL =4 and LCCA\_UL =5 in random access test cases with CCA for both LBE and FBE configurations.

Recommended WF:

* Please discuss which of these proposal(s) can be agreed.

**Issue 3-4-5: Requirement classification for statistical testing for random access TCs**

This issue is related to Issue 2-1-3. A discussion paper brought up the issue that for deterministic test cases under CCA, there might be a significant chance that some test runs do not experience any CCA failure. For random access TCs, that might be more relevant, since only 5 preamble retransmissions are expected in case there is no CCA failures. Having in mind that issue, please consider the following proposal:

Candidate proposal:

* Proposal 1 ([R4-2109282](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109282.zip)): Define that random access test cases are subject to statistical testing.

Recommended WF:

* Please discuss if Proposal 1 can be agreed.

**Issue 3-4-6: CCA success probability in random access TCs**

This issue is related to Issue 2-1-3. A discussion paper brought up the issue that for deterministic test cases under CCA, there might be a significant chance that some test runs do not experience any CCA failure. For random access TCs, that might be more relevant, since only 5 preamble retransmissions are expected in case there is no CCA failures. Having in mind that issue, please consider the following proposal:

Candidate proposal:

* Proposal 1 ([R4-2109282](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109282.zip)): Define PCCA probabilities that ensure that at least 15 out of 33 test runs experience more than one CCA failure.
* Proposal 2 ([R4-2109282](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109282.zip)): Define PCCA\_UL = 0.8 for both LBE and FBE modes in random access test cases.
* Proposal 3 ([R4-2109282](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109282.zip)): Define PCCA\_DL = 0.8 for FBE mode in random access test cases.

Recommended WF:

* Please discuss which of these proposal(s) can be agreed.

### Sub-topic 3-5: Timing (transmit timing and TA)

**Issue 3-5-1: CCA configuration on timing test cases**

Please consider the following proposal on the configuration of CCA failures for timing test cases.

Candidate proposal:

* Proposal 1 (R4-2108770): UE timing advance adjustment accuracy tests are defined for the following LBT configuration/setting in SpCell: PCCA\_UL=1 and PCCA\_DL =1 in all test times.

Recommended WF:

* Please discuss if we can agree with Proposal 1.

### Sub-topic 3-6: BWP switching delay and interruptions

**Issue 3-6-1: Configurations for BWP switch test cases**

Candidate proposals/options:

* Proposal 1 (R4-2108775): Endorse the configurations:

|  |  |  |
| --- | --- | --- |
| Active BWP in SpCell  | PCCA\_UL | PCCA\_DL |
| UL active BWP before active BWP switching (UL BWP-1) | 0 | 1 |
| UL active BWP after active BWP switching (UL BWP-2) | 1 | 1 |
| DL active BWP before active BWP switching (DL BWP-1) | 1 | 1 |
| DL active BWP after active BWP switching (DL BWP-2) | 1 | 1 |

Recommended WF:

* Please discuss if Proposal 1 can be agreed for BWP switch test cases.

### Sub-topic 3-7: Beam management (BFD and link recovery)

**Issue 3-7-1: CCA parameters for link recovery**

Candidate proposals/options:

* On the UL CCA success probability:
	+ Proposal 1a ([R4-2110651](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110651.zip)): Set PCCA\_UL=1.0 (no UL CCA failures) for link recovery tests.
	+ Proposal 1b ([R4-2110651](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110651.zip)): Set PCCA\_UL=1.0 (no UL CCA failures) for L1-RSRP measurement reporting tests.
* On the DL CCA success probability:
	+ Proposal 2 ([R4-2110651](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110651.zip)): For DL CCA success probabilities of link recovery and L1-RSRP reporting test cases, wait for the conclusion of the general principles of CCA modelling and the default probabilities.
* On the consolidated CCA parameters for link recovery tests:
	+ Proposal 3 (R4-2108776, [R4-2110651](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110651.zip)): Set the CCA parameters in the link recovery tests for NR-U as follows. For DL LBT parameters, RAN4 should wait for the conclusion of CCA models for NR-U RRM performance requirements.

**CCA parameters in link recovery tests for NR-U**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | T1 | T2 | T3 | T4 | T5 |
| PCCA\_DL | semi-static channel access | 1.0 | FFS | FFS | FFS | FFS |
| dynamic channel access (Note 1) | (1.0,1.0) | (FFS, FFS) | (FFS, FFS) | (FFS, FFS) | (FFS, FFS) |
| PCCA\_UL |  | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| Note 1: For dynamic channel access, the probability (X,Y) indicates PCCA\_DL\_1=X and PCCA\_DL\_2=Y. |

Recommended WF:

* Please discuss if we can agree on Proposals 1a, 1b, 2, and the consolidated table of Proposal 3.

### Sub-topic 3-8: RSSI/CO measurement accuracy (intra-frequency, inter-frequency, inter-RAT)

**Issue 3-8-1: Test cases for RSRP and RSRQ**

Candidate proposals/options:

* Proposal 1 ([R4-2111244](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111244.zip)): NR-U RSRP and RSRQ measurement accuracy test cases are designed for following cases:
	+ Intra-frequency RSRP measurement accuracy
	+ Inter-frequency RSRP measurement accuracy
	+ Intra-frequency RSRQ measurement accuracy
	+ Inter-frequency RSRQ measurement accuracy

Recommended WF:

* Can we agree on Proposal 1?

**Issue 3-8-2: Configuration for RSRP and RSRQ test cases**

Candidate proposals/options:

* Proposal 1 ([R4-2111244](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111244.zip)): NR-U RSRP and RSRQ measurement accuracy test cases are designed for following test configuration:

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations in each supported band |

* Proposal 2 ([R4-2111244](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111244.zip)): Cell specific test parameters should contain following new or modified parameters to account for the LBT impact:
	+ DL CCA model
	+ UL CCA model
	+ DBT Window Configuration
	+ DL CCA probability PCCA\_DL
	+ UL CCA probability PCCA\_UL
	+ SSB configuration
	+ New RMCs

Recommended WF:

* Can we agree on Proposals 1 and 2?

### Sub-topic 3-9: TCI state switching

**Issue 3-9-1: Timing difference between RSs in two TCI states**

Candidate proposals/options:

* Proposal 1 (R4-2108777): Introduce the timing difference between the RS in the two TCI states in the TCI state switching test cases, where the exact value needs further discussion.
* Proposal 2 (R4-2108777): Confirm on the testability of Proposal 1.

Recommended WF:

* Proposal1 has been discussed since the last RAN4 meeting. Can we agree on that?

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub-topic 3-1: RRC IDLE cell re-selectionIssue 3-1-1: How to introduce RRC IDDLE cell re-selection test cases…Sub-topic 3-2: HO (delay and interruptions)Issue 3-2-1: HO scenarios…Issue 3-2-2: HO CCA success probability in UL…Issue 3-2-3: HO test behaviour after T304 expires…Sub-topic 3-3: RRC Re-establishmentIssue 3-3-1: RRC re-establishment tests cases…Issue 3-3-2: RRC re-establishment configurations…Issue 3-3-3: Out of sync detection evaluation period in tests with CCA…Issue 3-3-4: CCA probabilities for RRC re-establishment test cases in DL…Issue 3-3-5: CCA probabilities for RRC re-establishment test cases in UL…Sub-topic 3-4: Random accessIssue 3-4-1: Differentiation of FBE and LBE configurations in random access test cases…Issue 3-4-2: Configuration of DL CCA for random access test cases…Issue 3-4-3: Preamble received target power configuration…Issue 3-4-4: Limitation of CCA failures in UL for random access TCs…Issue 3-4-5: Requirement classification for statistical testing for random access TCs…Issue 3-4-6: CCA success probability in random access TCs…3.2.5 Sub-topic 3-5: Timing (transmit timing and TA)Issue 3-5-1: CCA configuration on timing test cases…Sub-topic 3-6: BWP switching delay and interruptionsIssue 3-6-1: Configurations for BWP switch test cases…Sub-topic 3-7: Beam management (BFD and link recovery)Issue 3-7-1: CCA parameters for link recovery…Sub-topic 3-8: RSSI/CO measurement accuracy (intra-frequency, inter-frequency, inter-RAT)Issue 3-8-1: Test cases for RSRP and RSRQ…Issue 3-8-2: Configuration for RSRP and RSRQ test cases…Sub-topic 3-9: TCI state switchingIssue 3-9-1: Timing difference between RSs in two TCI states… |
| Nokia | Sub-topic 3-1: RRC IDLE cell re-selectionIssue 3-1-1: How to introduce RRC IDDLE cell re-selection test casesWe are fine with Proposal 1. Sub-topic 3-2: HO (delay and interruptions)Issue 3-2-1: HO scenariosAgree with Proposal 1. Issue 3-2-2: HO CCA success probability in ULWe would prefer to wait for the decision on Issue 2-3-1. In general we are fine with that probability, but we would rather make this decision in a general way, unless there is something special about the handover test case that would justify a different PCCA\_UL.Issue 3-2-3: HO test behaviour after T304 expiresWe prefer to avoid discarding test runs. Therefore we propose to consider LCCA\_DL and LCCA\_UL such that T304 is not expired due to CCA failures in the HO test case.Considering the calculation of the HO delay as* Intra-frequency handover from FR1 carrier under CCA to FR1 carrier under CCA; known target cell

Tinterrupt = Tsearch + TIU + Tprocessing + T∆ + Tmargin= 0 + (1+ L3)\*10 + 10 ms + 20 ms + (1+ L2) \*20 ms + 2 ms= 72ms + L2\*20ms + L3\*10msAssuming the worst case scenario, where L2 = LCCA\_DL and L3 = LCCA\_UL, thenLCCA\_DL \*20ms + L3\*10ms <= T302 – 72msFor LCCA\_DL = 5 and LCCA\_UL = 5, thenT302 >= 222ms* Intra-frequency handover from FR1 carrier under CCA to FR1 carrier under CCA; unknown target cell

Tinterrupt = Tsearch + TIU + Tprocessing + T∆ + Tmargin= (1+L1)\* 20 ms + (1+ L3)\*10 + 10 ms + 20 ms + (1+ L2) \*20 ms + 2 ms= 92ms+ L1\*20ms + L2\*20ms + L3\*10msAssuming the worst case where L1 + L2 = LCCA\_DL and L3 = LCCA\_UL, thenLCCA\_DL\*20ms + LCCA\_UL\*10ms <= T302 – 92msFor LCCA\_DL = 5 and LCCA\_UL = 5, thenT302 >= 242ms* Inter-frequency handover from FR1 carrier under CCA to FR1 carrier under CCA; unknown target cell

Tinterrupt = Tsearch + TIU + Tprocessing + T∆ + Tmargin= (3+L1’)\* 20 ms + (1+ L3)\*10 + 10 ms + 20 ms + (1+ L2) \*20 ms + 2 ms= 132ms + L1’\*20 ms + L2\*20ms + L­\*10msAssuming the worst case where L1’ + L2 = LCCA\_DL and L3 = LCCA\_UL, thenLCCA\_DL \*20ms + LCCA\_UL \*10ms < T302 – 132msFor LCCA\_DL = 5 and LCCA\_UL = 5, thenT302 >= 282msFrom that we derive the following proposal: **Proposal 2: Configure LCCA\_DL and LCCA\_UL such that T304 is not expired due to CCA failures in the HO test case.****Proposal 3: Configure LCCA\_DL = LCCA\_UL = 5, WCCA =T304, and T304=500ms in the HO test case with CCA.**Sub-topic 3-3: RRC Re-establishmentIssue 3-3-1: RRC re-establishment tests casesWe agree with Proposal 1. Issue 3-3-2: RRC re-establishment configurationsFine with Proposal 1. Issue 3-3-3: Out of sync detection evaluation period in tests with CCAWe agree with Proposal 1. Issue 3-3-4: CCA probabilities for RRC re-establishment test cases in DLWe prefer to wait for decision on general PCCA\_DL.We are in general in line with Proposal 1, but we rather discuss that on the general issue for PCCA, unless there is a technical reason to have different probabilities for re-establishment. Issue 3-3-5: CCA probabilities for RRC re-establishment test cases in ULWe prefer to wait for the decision on general PCCA\_UL. Same reason as previous issue. Sub-topic 3-4Issue 3-4-1: Differentiation of FBE and LBE configurations in random access test casesWe agree with the proposal.Issue 3-4-2: Configuration of DL CCA for random access test casesWe agree with proposal 1 for dynamic channel access. For semi-static channel access we agree with proposal 2, given that for such a mode the UE is allowed to transmit only with a gNB-initiated COT.Issue 3-4-3: Preamble received target power configurationWe don’t agree with the proposal. In our view, the preamble target power should be tested with the same values as used for NR test cases, otherwise the UE power ramping will not be tested under CCA. There is a specific behavior that is to be tested here, because the UE is only supposed to do power ramping during retransmissions, but not when it has to transmit again due to CCA failure. By setting the perambleReceivedTargetPower to the highest value would mean that the UE will transmit PRACH with the same power for all the transmissions during the test. Issue 3-4-4: Limitation of CCA failures in UL for random access TCsWe agree with all proposals.Issue 3-4-5: Requirement classification for statistical testing for random access TCsWe agree with the proposal.Issue 3-4-6: CCA success probability in random access TCsWe agree with all proposals.Sub-topic 3-5: Timing (transmit timing and TA)Issue 3-5-1: CCA configuration on timing test casesWe think we should adopt the PCCA\_DL as agreed for the general test cases. We propose the following alternative option:* Option 2: UE timing advance adjustment accuracy tests are defined for the following LBT configuration/setting in SpCell: PCCA\_UL=1 and the default PCCA\_DL value in all test times.

Sub-topic 3-6: BWP switching delay and interruptionsIssue 3-6-1: Configurations for BWP switch test casesWe agree with the proposal.Sub-topic 3-7: Beam management (BFD and link recovery)Issue 3-7-1: CCA parameters for link recoveryWe agree with the proposalSub-topic 3-8: RSSI/CO measurement accuracy (intra-frequency, inter-frequency, inter-RAT)Issue 3-8-1: Test cases for RSRP and RSRQWe agree with Proposal 1Issue 3-8-2: Configuration for RSRP and RSRQ test casesWe agree with Proposal 1 and 2 |
| MTK | Issue 3-1-1: fine with Proposal 1.Issue 3-1-2: fine with Proposal 1.Issue 3-2-3: fine with Nokia’s suggestion. Issue 3-4-1: We agree with the proposal. |
| Qualcomm | **Issue 3-2-2: HO CCA success probability in UL**Do not support the proposal for FBE.**Issue 3-2-3: HO test behaviour after T304 expires**Fine with the proposal**Issue 3-3-4: CCA probabilities for RRC re-establishment test cases in DL**Wait for decision on Topic 2-2**Issue 3-3-5: CCA probabilities for RRC re-establishment test cases in UL**Fine with the proposal**Issue 3-4-2: Configuration of DL CCA for random access test cases**Fine with option 1**Issue 3-4-3: Preamble received target power configuration**Support the proposal**Issue 3-4-6: CCA success probability in random access TCs**Do not agree with the proposals.**Issue 3-5-1: CCA configuration on timing test cases**Is the test really needed?**Issue 3-6-1: Configurations for BWP switch test cases**Please specify that this is for BWP switch on consisten UL LBT failure recovery. If yes, then we are fine with the proposal.  |
| Huawei | **Issue 3-2-2:**Fine with the recommended WF.**Issue 3-2-3:**Fine with the suggestion from Nokia and we assume that the limitation only apply for the test cases.**Issue 3-9-1**As had been discussed in the previous meeting, option 1 is the straightforward method to have FR1 TCI siwthcing test. But as also mentioned in the proponent paper, the testability issue is not clear. Since it was agreed in last meeting that the TCI switching TC is in low priority, then it is preferred not to have the TC. |
| Ericsson | **Issue 3-2-1: HO scenarios**These test cases are already developed and should be in the endorsed big CR, R4-2105716 and R4-2105717. Thus proposal 1 is agreeable. **Issue 3-2-2: HO CCA success probability in UL**Recommended WF is fine. **Issue 3-2-3: HO test behaviour after T304 expires**We are also fine with the proposal from Nokia to avoid that T304 does not expire before due to CCA failure tbefore he test is complete. **Issue 3-3-1: RRC re-establishment tests cases**Proposal 1 is agreeable. **Issue 3-3-2: RRC re-establishment configurations**Proposal 1 is agreeable. **Issue 3-3-3: Out of sync detection evaluation period in tests with CCA**Proposal 1 is agreeable. **Issue 3-3-4: CCA probabilities for RRC re-establishment test cases in DL**We propose to follow the agreement from GTW session on the CCA probabilities. **Issue 3-3-5: CCA probabilities for RRC re-establishment test cases in UL**We propose to follow the agreement from GTW session on the CCA probabilities. **Issue 3-4-1: Differentiation of FBE and LBE configurations in random access test cases**Proposal 1is fine. **Issue 3-4-2: Configuration of DL CCA for random access test cases**Option 1 is agreeable to us.**Issue 3-4-4: Limitation of CCA failures in UL for random access TCs**We tend to agree to define LCCA\_UL, but we are wondering if LCCA\_DL is necessary if we set PCCA,DL is set to 1.0 after UE transmits preamble or TE receive preamble. Then we can avoid the discussion how to set LCCA\_DL for test cases. **Issue 3-4-5: Requirement classification for statistical testing for random access TCs**We should follow the conclusion on Issue 2-1-3. **Issue 3-4-6: CCA success probability in random access TCs**We propose to follow the CCA failure probability agreement from the GTW session.**Issue 3-5-1: CCA configuration on timing test cases**Proposal 1 is fine.**Issue 3-6-1: Configurations for BWP switch test cases**Proposal 1 is fine.**Issue 3-7-1: CCA parameters for link recovery**We propose to follow the CCA probabilities from the GTW session agreement. We are also fine with all three proposals here.  **Issue 3-8-1: Test cases for RSRP and RSRQ**Proposal 1 is fine.**Issue 3-8-2: Configuration for RSRP and RSRQ test cases**Proposal 1 is fine.**Issue 3-9-1: Timing difference between RSs in two TCI states**Propsal 1 is from the agreed WF from last meeting and should be agreeable.  |
| NokiaEnd reply | Sub-topic 3-4: Random accessIssue 3-4-2: Configuration of DL CCA for random access test casesWe prefer Option 2I wanted to clarify the motication for configuring DL CCA for random access test cases. Since most companies showed it is ok to use the RA TC for differentiation of FBE and LBE, we think it is a good idea to use it to verify the havility of the UE to acquire the COT. Since for FBE, the UE is not able to acquire COT, we would like to have the DL CCA failure. In the random access TC, we have already included in the endorsed CR this condition:* *In case of CCA DL failure, the test equipment should verify that the UE does not transmit PRACH for semi-static channel access mode; for dynamic channel access mode it is assumed that RACH occasions are always scheduled within a UE-initiated COT.*

Which implies that DL CCA failures are used, because if the gNB doesn’t acquire the COT and the UE transmits anyway this should be threated as an error for semi-static occupancy configuration.  |

### CRs/TPs comments collection

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| CR/TP number | Comments collection |
| 6.1.6.3.2 | RRC IDLE cell re-selection |
| [**R4-2111242**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111242.zip)**Ericsson****Draft CR** | **Correction to cell reselection test cases for NR-U** |
| Nokia: We suggest to add comments to Table A.11.1.1.1.2-2, Table A.11.1.1.1.2-3, Table A.11.1.1.2.2-2, Table A.11.1.1.2.2-3Table A.11.1.1.3.2-2, Table A.11.1.1.3.2-3, Table A.11.1.1.4.2-2, and Table A.11.1.1.4.2-3indicating applicability of the requirements for LBE and FBE configurations as was defined in other test cases, such as random access. From our agreement last meeting, cell reselection test cases should be run for FBE and LBE for UEs supporting both operation modes.  |
| Company B… |
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| 6.1.6.3.3 | HO (delay and interruptions) |
| [**R4-2109279**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109279.zip)**Nokia****Draft CR** | **Draft TC NR-U Handover test cases** |
| Company A… |
| Company B… |
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| [**R4-2110329**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110329.zip)**Huawei****Draft CR** | **Draft CR on HO test cases for NR-U** |
| Nokia:We suggest adding a note on the configuration tables indicating the applicability of FBE/LBE configurations.Also, assuming that we will reach consensus on Issue 3-2-3 for Proposal 2 and Proposal 3, we suggest to configure LCCA\_DL and LCCA\_UL such that T304 is not expired due to CCA failures in the HO test case, as well as to configure LCCA\_DL = LCCA\_UL = 5, WCCA =T304, and T304=500ms in the HO test cases with CCA. |
| Ericsson: CCA failure probabilities should be aligned with other test cases.  |
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| [**R4-2111243**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111243.zip)**Ericsson****Draft CR** | **Correction to handover test cases for NR-U** |
| Nokia:We suggest adding a note on the configuration tables indicating the applicability of FBE/LBE configurations.We also suggest fixing typo on the value for DL CCA probability for semi-static channel access for Cell 1 in Table A.11.2.1.4.2-3 , i.e. **0.9TBD** |
| Company B… |
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| 6.1.6.3.4 | RRC Re-establishment |
| [**R4-2109280**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109280.zip)**Nokia****Draft CR** | **Draft TC RRC re-establishment with CCA** |
| Ericsson: Pcca is still TBD |
| Company B… |
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| [**R4-2110330**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110330.zip)**Huawei****Draft CR** | **Draft CR on RRC Re-establishment for NR-U from NR to NRU** |
| NokiaPending on decisions of subtopic 3-3Add note on configuration tables regarding FBE/LBE applicability |
| Ericsson: There is also another draft CR for this test (NR->NR-U) in R4-2111307. There are 3 test cases. But this CR contains only one on inter-freq case and Pcca is still TBD. Thus we prefer to work on R4-2111307.  |
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| 6.1.6.3.5 | RRC Connection Release with Redirection |
| [**R4-2110331**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110331.zip)**Huawei****Draft CR** | **Draft CR on TC of RRC connection release with redirection for NR-U** |
| NokiaAdd note on configuration tables regarding FBE/LBE applicabilityAbout the Lmax, if the text proposal in R4-2109276 is endorsed, we suggest to replace the last sentence starting with “The test equipment ensure that …” and adding a row in the configuration tables with some thing like this:

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| --- | --- |
| LCCA\_DL | L1,max as defined in Table 6.2.3.2.3-1 |

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| Ericsson: Pcca is still TBD. |
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| [**R4-2111307**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111307.zip)**Ericsson****Draft CR** | **RRC re-establishment tests from NR to NR-U in 38.133** |
| NokiaPending on decisions of subtopic 3-3Add note on configuration tables regarding FBE/LBE applicability |
| Company B… |
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| 6.1.6.3.6 | Random access |
| [**R4-2109281**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109281.zip)**Nokia****Draft CR** | **Random Access test cases with CCA** |
| Ericsson: Not sure we can set 'L\_CCA\_DL, L\_CCA\_DL, L\_CCA\_UL as a parameter in the test case because it is not clear the definition. If necessary it can be mentioned in the procedure.; What is the reason to change the power of the 1st preamble to -22dBm from -30dBm? |
| Nokia:In reply to Ericsson, the L\_CCA proposal is related to the addition ot the CCA model in R4-2109276, included in Issue 2-3-2. About the power of the first preamble, this is following a change that was made to the NR requirements in [98e][202] NR\_NewRAT\_RRM\_Perf, with summary R4-2103684. The original CR is this: R4-2103487. According to Mediatek, there was a problem in the calculation of the preamble power which was corrected with their CR on RAN4#98e. So, if we are having power parameters that are in line with the NR spec we should also update the NR-U test cases.  |
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| [**R4-2110653**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110653.zip)**Ericsson****Draft CR** | **Draft CR: Random access procedure test cases for NR-U** |
| Nokia:There are few issues that we could like to be addressed in the random access test case that we have included in the R4-2109281 CR, like applicability of LBE/FBE, power of the first preamble transmission, and configuration of LCCA\_DL and LCCA\_UL, and new NR-U specific PRACH/MsgA configurations. So we propose to merge the changes from clauses A.10, and A.11 from R4-2109281 into R4-2110653, and using a revised version of R4-2109281 for the PRACH/MsgA configurations in clause A.3 |
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| 6.1.6.3.7 | Timing (transmit timing and TA) |
| [**R4-2111308**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111308.zip)**Ericsson****Draft CR** | **Correction to UE transmit timing tests** |
| NokiaWe suggest adding a note on the configuration tables indicating the applicability of FBE/LBE configurations. |
| Company B… |
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| 6.1.6.3.8 | BWP switching delay and interruptions |
| [**R4-2111309**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111309.zip)**Ericsson****Draft CR** | **Correction to BWP switching with consistent UL LBT failures** |
| Nokia:We suggest adding a note on the configuration tables indicating the applicability of FBE/LBE configurations. |
| Company B… |
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| 6.1.6.3.9 | PSCell addition/release (delay and interruption) |
| [**R4-2110332**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110332.zip)**Huawei****Draft CR** | **Draft CR on PSCell addtion for NR-U** |
| NokiaRegarding the discarding test runs if T304 expires, we think it is better to avoid that situation by appropriate configuration of LCCA\_DL as described in our reply to the issueIssue 3-2-3: HO test behaviour after T304 expiresIt should be possible to configure LCCA\_DL and T304 in a way that this timer would not expired for a DUT with appropriate implementation. Additionally, we suggest including the applicability of LBE and FBE configurations as a note in the configuration tables. |
| Ericsson: In general OK. In the following R99-e change, "test" shall be replaced by "iteration": "A test will not be considered in the statistics when T304 times expires considering the time extensions cause by L2 . " |
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| 6.1.6.3.10 | SCell activation/deactivation (delay and interruption) |
| [**R4-2110963**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110963.zip)**Ericsson****Draft CR** | **NR-U SCell activation TC** |
| NokiaWe suggest adding a note on the configuration tables indicating the applicability of FBE/LBE configurations. |
| Company B… |
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| 6.1.6.3.11 | Other interruptions |
| [**R4-2110964**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110964.zip)**Ericsson****Draft CR** | **NR-U Other interruption TC** |
| NokiaWe suggest adding a note on the configuration tables indicating the applicability of FBE/LBE configurations. |
| Company B… |
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| 6.1.6.3.13 | Beam management (BFD and link recovery) |
| [**R4-2110652**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110652.zip)**Ericsson****Draft CR** | **Draft CR: Update of beam management test cases for NR-U** |
| MTK: * We have concern on BFD tests 2, regarding SNR3 (SNR\_SSB of set q0)= -7dB during T3~T5.
* The Qout\_LR was assumed as -6dB. Given the SNR3 = -7 dB, it means almost no margin (only 1 dB) for UE because the SNR estimated @ UE may be higher than -6dB and UE will not trigger the beam failure indication and fail the test. In R15, the SNR margin between Qout\_LR and SNR2/4 is 3dB.

Our understanding on the SINREST of -7dB is the estimated SINR at the UE side, as the agreement in R4-2008567 RAN4-94e (see slide 6), so it needs to consider sufficient SNR margin to make sure the SNR@UE will be higher to equal to -7dB.  |
| Nokia:We suggest adding a note on the configuration tables indicating the applicability of FBE/LBE configurations.We suggest adding a note on the configuration tables indicating the applicability of FBE/LBE configurations.Assuming we will reach consensus on Issue 3-7-1 for Proposals 1a, 1b, 2, and the consolidated table of Proposal 3, we’re OK with the proposed changes for the .DL and UL CCA probabilities. |
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| 6.1.6.3.14 | SS-RSRP/SS-RSRQ/SS-SINR/L1-RSRP measurement procedure (intra-frequency, inter-frequency, inter-RAT) |
| [**R4-2109277**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109277.zip)**Nokia****Draft CR** | **Draft TC NR-U inter-frequency measurements** |
| Company A… |
| Company B… |
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| [**R4-2109853**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109853.zip)**Mediatek****Draft CR** | **Draft CR of test cases on measurement accuracy under CCA for inter-frequency SS-RSRP and L1-RSRP** |
| NokiaConsider to update the DL and UL CCA models depending on the configured channel access mode according to the ongoing discussions. We suggest adding a note on the configuration tables indicating the applicability of FBE/LBE configurations. |
| Ericsson: Looks good in general. RSRP test in EN-DC is overlapping with Ericsson’s CR which is more complete as it includes inra-frequency case and RSRQ test. |
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| [**R4-2110333**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110333.zip)**Huawei****Draft CR** | **Draft CR of test cases for Inter-RAT measurement for NR-U** |
| Nokia Consider to update the DL and UL CCA models depending on the configured channel access mode according to the ongoing discussions. We suggest adding a note on the configuration tables indicating the applicability of FBE/LBE configurations. |
| Company B… |
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| 6.1.6.3.16 | SFTD measurement procedure |
| [**R4-2110965**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110965.zip)**Ericsson****Draft CR** | **NR-U SFTD procedure TC** |
| NokiaWe suggest adding a note on the configuration tables indicating the applicability of FBE/LBE configurations. |
| Company B… |
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| 6.1.6.3.17 | SS-RSRP/SS-RSRQ/SS-SINR/L1-RSRP measurement accuracy (intra-frequency, inter-frequency, inter-RAT) |
| [**R4-2110334**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110334.zip)**Huawei****Draft CR** | **Draft CR of test cases for Intra-frequency measurement accuracy for NR-U** |
| NokiaWe suggest adding a note on the configuration tables indicating the applicability of FBE/LBE configurations. |
| Ericsson: test 1 is not applicable for this case. Band info should be updated, thus also the values. Overlapping with Ericsson’s CR which is more complete as it contains intra-frequency, inter-frequency RSRP and also RSRQ tests. |
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| [**R4-2111245**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111245.zip)**Ericsson****Draft CR** | **RSRP/RSRQ measurement accuracy test for NR-U in EN-DC** |
| NokiaWe suggest adding a note on the configuration tables indicating the applicability of FBE/LBE configurations.Several parameters defined in Table A.10.5.1.1.2-2: SS-RSRP Intra frequency test parameters refers to Config 3 and 6. Only configurations 1 and 2 are defined. Please review the table |
| Company B… |
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| 6.1.6.3.18 | RSSI/CO measurement accuracy (intra-frequency, inter-frequency, inter-RAT) |
| [**R4-2109302**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109302.zip)**Apple****Draft CR** | **TCs for RSSI and CO measurement accuracy in NR-U R16** |
| NokiaWe suggest adding a note on the configuration tables indicating the applicability of FBE/LBE configurations.For the cases where CCA failures are not enabled, we suggest using PCCA=1 instead of NA.  |
| Company B… |
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| 6.1.6.3.19 | SFTD measurement accuracy |
| [**R4-2110966**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110966.zip)**Ericsson****Draft CR** | **NR-U SFTD accuracy TC** |
| NokiaWe suggest adding a note on the configuration tables indicating the applicability of FBE/LBE configurations. |
| Company B… |
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|  |

## 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:* |
| **Sub-topic#3-1** | Sub-topic 3-1: RRC IDLE cell re-selectionIssue 3-1-1: How to introduce RRC IDDLE cell re-selection test casesTwo companies commented that agreed on the proposal, and no concern was raised. Therefore, it is suggested to agree on the issue. Tentative agreements:* Define separate tests for the test cases below:
	+ Cell reselection for E-UTRAN (FDD,TDD)->NR-U and NR-U -> E-UTRAN (FDD,TDD).
	+ Cell reselection for NR(FR1) -> NR-U and NR-U -> NR(FR1).

Recommendations for the 2nd round* Tentative agreement is agreeable
 |
| **Sub-topic#3-2** | Sub-topic 3-2: HO (delay and interruptions)Issue 3-2-1: HO scenariosTwo companies commented that agreed on the proposal, and no concern was raised. Therefore, it is suggested to agree on the issue. Tentative agreements:* Specify test cases to verify correct UE behavior for all scenarios:
	+ E-UTRAN (FDD,TDD)->NR-U,
	+ NR-U -> E-UTRAN (FDD,TDD),
	+ NR(FR1) -> NR-U
	+ NR-U -> NR(FR1).

Recommendations for the 2nd round* Tentative agreement is agreeable

Issue 3-2-2: HO CCA success probability in ULSince the topic is discussed in a general way on Issue 2-3-1, most companies agreed to postpone decision on that issue. Candidate options:* Proposal 1: Configure PCCA\_UL as 0.75 to model the addition delay in acquiring the PRACH resource.

Recommendations for the 2nd round* Continue discussion on Issue 2-3-1 and verify if specific probability is needed for Handover test cases.

Issue 3-2-3: HO test behaviour after T304 expiresComments on the first round suggest that the new proposals 2 and 3 included in the 1st round comments are agreeable. Please confirm this agreement in the second round. Tentative agreements:* Configure LCCA\_DL and LCCA\_UL such that T304 is not expired due to CCA failures in the HO test case.
* Configure LCCA\_DL = LCCA\_UL = 5, WCCA =T304, and T304=500ms in the HO test case with CCA.

Recommendations for the 2nd round* Confirm the tentative agreement.
 |
| **Sub-topic#3-3** | Sub-topic 3-3: RRC Re-establishmentIssue 3-3-1: RRC re-establishment tests casesTwo companies commented that agreed on the proposal, and no concern was raised. Therefore, it is suggested to agree on the issue. Tentative agreements:* At least the following NR to NR-U RRC re-establishment tests to verify core requirements in clause 6.2.1A, TS 38.133, are defined:
	+ TC1: Intra-frequency RRC Re-establishment in FR1 with serving cell without CCA and known target cell subject to CCA
	+ TC2: Inter-frequency RRC Re-establishment in FR1 with serving cell without CCA and with unknown target cell subject to CCA
	+ TC3: Intra-frequency RRC Re-establishment in FR1 with serving cell without CCA, with unknown target cell subject to CCA and without serving cell timing.

Recommendations for the 2nd round* Tentative agreement is agreeable

Issue 3-3-2: RRC re-establishment configurationsTwo companies commented that agreed on the proposal, and no concern was raised. Therefore, it is suggested to agree on the issue. Tentative agreements:* NR to NR-U RRC re-establishment tests are defined for the following configuration related to SSB SCS and BW for both serving and target cells:

|  |  |  |
| --- | --- | --- |
| Configuration | Source cell without CCA | Target cell with CCA |
| 1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD | 30 kHz SSB SCS, 40 MHz bandwidth, TDD |
| 2 | 15 kHz SSB SCS, 10 MHz bandwidth, TDD | 30 kHz SSB SCS, 40 MHz bandwidth, TDD |
| 3 | 30 kHz SSB SCS, 40 MHz bandwidth, TDD | 30 kHz SSB SCS, 40 MHz bandwidth, TDD |
| Note: The UE is only required to be tested in one of the supported test configurations |

Recommendations for the 2nd round* Tentative agreement is agreeable

Issue 3-3-3: Out of sync detection evaluation period in tests with CCATwo companies commented that agreed on the proposal, and no concern was raised. Therefore, it is suggested to agree on the issue. Tentative agreements:* In the test under the following parameter settings (non-DRX, no gaps are used and SSB periodicity is 20 ms), the out of sync detection evaluation period = 480 ms when the serving cell is inactivated (RLM-RS SSB Es/Iot <-7 dB).

Recommendations for the 2nd round* Tentative agreement is agreeable

Issue 3-3-4: CCA probabilities for RRC re-establishment test cases in DLCompanies commenting ont hat issue wanted to wait for the decision on the Topic #2. Since there is a decision reached in the GTW session, please consider if the default values can be used here or if something else should be defined. Candidate options:* Option 1: NR to NR-U RRC re-establishment tests can be defined for the following DL LBT configuration/setting in the target cell during T3 (when UE detects the target cell):
	+ For LBE: PCCA\_DL\_1 =0.75, PCCA\_DL\_2 =0.5
	+ For FBE: PCCA\_DL= 0.9
* Option 2: Use the deafault PCCA\_DL values.

Recommendations for the 2nd round* The comments on the 1st round show tendency towards Option 2, so it is recommented to agree on Option 2.

Issue 3-3-5: CCA probabilities for RRC re-establishment test cases in ULSince RRC re-establishment was not included in the test case list of Issue 2-3-3, it is proposed to close this issue. Recommendations for the 2nd round* No further discussion is needed.
 |
| **Sub-topic#3-4** | Sub-topic 3-4: Random accessIssue 3-4-1: Differentiation of FBE and LBE configurations in random access test casesAll companies commenting on this issue agreed with Proposal 1. Therefore it is proposed to agree on Proposal 1. Tentative agreements:* Define configuration of random access test cases that help differentiating the UE behaviour when configured with semi-static and dynamic channel access modes.

Recommendations for the 2nd round* Tentative agreement is agreeable.

Issue 3-4-2: Configuration of DL CCA for random access test casesThere was no consensus on that topic for semi-static channel access configurations. Therefore the issue remains open. Tentative agreements:* NR-U random access procedure tests with dynamic channel access configuration do not need to configure DL LBT failure, i.e., set PCCA\_DL=1.0.

Candidate options:* Option 1:\_ NR-U random access procedure tests with semi-static channel access configuration do not need to configure DL LBT failure, i.e., set PCCA\_DL=1.0.
* Option 2: Configure DL CCA failures for the random access test cases for semi-static channel access configuration.

Recommendations for the 2nd round* Continue discussion on whether DL CCA failures need to be modelled for semi-static channel access configuration.

Issue 3-4-3: Preamble received target power configurationNo consensus on this issue, so it remains open. Candidate options:* Option 1: Test equipment to configure *preambleReceivedTargetPower* for msg1 and *msgA-PreambleReceivedTargetPower* for msgA to the highest value for UL LBT test cases.
* Option 2: Test equipment to reuse NR configurations for *preambleReceivedTargetPower* for msg1 and *msgA-PreambleReceivedTargetPower* for msgA for RA test cases with UL CCA failures.

Recommendations for the 2nd round* Further discuss which option is agreeable.

Issue 3-4-4: Limitation of CCA failures in UL for random access TCsOne company questioned the proposed configuration, since LCCA\_DL might not be needed ifwe agree on no DL CCA failures for random access test cases. Therefore, we suggest the following agreement, with open Tentative agreements:* Define random access test cases that limit the number of CCA failures in UL and DL to prevent reaching preambleTransMax for both LBE and FBE configurations.
* Define preambleTransMax, LCCA\_DL and LCCA\_UL in random access test cases with CCA such that preambleTransMax > 5 + L LCCA\_DL + LCCA\_UL for both LBE and FBE configurations
* Define preambleTransMax = n20, LCCA\_DL =4 and LCCA\_UL =5 in random access test cases with CCA for both LBE and FBE configurations.
* NOTE: LCCA\_DL is only configured ifPCCA\_DL≠1

Recommendations for the 2nd round* Confirm the tentative agreement.

Issue 3-4-5: Requirement classification for statistical testing for random access TCsOne company preferred to wait for the conclusion on Issue 2-1-3. Therefore we propose to keep this issue opened. Candidate options:* Proposal 1: Define that random access test cases are subject to statistical testing.

Recommendations for the 2nd round* Discuss if this is needed to be decided for random access test case, or if it is enough to conclude on Issue 2-1-3.

Issue 3-4-6: CCA success probability in random access TCsNo consensus on the proposals, therefore we propose to continue discussion using the following options. Candidate options:* On the principles for defining PCCA.
	+ Option 1: Define PCCA probabilities that ensure that at least 15 out of 33 test runs experience more than one CCA failure.
	+ Other options?
* On the probabilities of CCA failures in UL
	+ Option 1: Define PCCA\_UL = 0.8 for both LBE and FBE modes in random access test cases.
	+ Other options?
* On the probabilities of CCA failures in DL
	+ Option 1: Define PCCA\_DL = 0.8 for FBE mode and PCCA\_DL = 1 for LBE mode in random access test cases.
	+ Other options?

Recommendations for the 2nd round* Split the issue into 3 and discuss each part individually.
 |
| **Sub-topic#3-5** | Sub-topic 3-5: Timing (transmit timing and TA)Issue 3-5-1: CCA configuration on timing test casesOnly one comment agains the proposal from Nokia, who agree to compromise. Therefore agreement can be reached in this issue. Tentative agreements:* UE timing advance adjustment accuracy tests are defined for the following LBT configuration/setting in SpCell: PCCA\_UL=1 and PCCA\_DL =1 in all test times.

Recommendations for the 2nd round* Tentative agreement is agreeable.
 |
| **Sub-topic#3-6** | Sub-topic 3-6: BWP switching delay and interruptionsIssue 3-6-1: Configurations for BWP switch test casesMost companies agreed with he proposal, but one asked for clarification if this is for BWP switch with consistent UL LBT failure recovery. Candidate options:* Option 1: Endorse the configurations:

|  |  |  |
| --- | --- | --- |
| Active BWP in SpCell  | PCCA\_UL | PCCA\_DL |
| UL active BWP before active BWP switching (UL BWP-1) | 0 | 1 |
| UL active BWP after active BWP switching (UL BWP-2) | 1 | 1 |
| DL active BWP before active BWP switching (DL BWP-1) | 1 | 1 |
| DL active BWP after active BWP switching (DL BWP-2) | 1 | 1 |

* Option 2: Endorse the configurations with consistent UL BWP switch on consisten UL LBT failure recovery:

|  |  |  |
| --- | --- | --- |
| Active BWP in SpCell  | PCCA\_UL | PCCA\_DL |
| UL active BWP before active BWP switching (UL BWP-1) | 0 | 1 |
| UL active BWP after active BWP switching (UL BWP-2) | 1 | 1 |
| DL active BWP before active BWP switching (DL BWP-1) | 1 | 1 |
| DL active BWP after active BWP switching (DL BWP-2) | 1 | 1 |

Recommendations for the 2nd roundCan we agree on Option 2 based on the 1st round comments? |
| **Sub-topic#3-7** | Sub-topic 3-7: Beam management (BFD and link recovery)Issue 3-7-1: CCA parameters for link recoveryThe 1st round comments indicated that we should follow the decisions doem Topic #2. Since the GTW decision Issue 2-3-3 for no UL CCA failure for BM TCs, so Proposals 1a and 1b are implicitly accepted, and the DL CCA probabilities were decided in Issue 2-2-1. Therefore it is proposed to confirm if we can agree on Option 1 below. Candidate options:* + Option 1: Set the CCA parameters in the link recovery tests for NR-U as follows. For DL LBT parameters, RAN4 should wait for the conclusion of CCA models for NR-U RRM performance requirements.

**CCA parameters in link recovery tests for NR-U**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | T1 | T2 | T3 | T4 | T5 |
| PCCA\_DL | semi-static channel access | 1.0 | 0.9375 | 0.9375 | 0.9375 | 0.9375 |
| dynamic channel access (Note 1) | (0.75,0.5) | (0.75,0.5) | (0.75,0.5) | (0.75,0.5) | (0.75,0.5) |
| PCCA\_UL |  | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| Note 1: For dynamic channel access, the probability (X,Y) indicates PCCA\_DL\_1=X and PCCA\_DL\_2=Y. |

Recommendations for the 2nd round* Agree on Option 1.
 |
| **Sub-topic#3-8** | Sub-topic 3-8: RSSI/CO measurement accuracy (intra-frequency, inter-frequency, inter-RAT)Issue 3-8-1: Test cases for RSRP and RSRQOnly a single company provide its view regarding this topic. Based on the contribution, the following is proposed to be agreed:Tentative agreements:* NR-U RSRP and RSRQ measurement accuracy test cases are designed for following cases:
	+ Intra-frequency RSRP measurement accuracy
	+ Inter-frequency RSRP measurement accuracy
	+ Intra-frequency RSRQ measurement accuracy
	+ Inter-frequency RSRQ measurement accuracy

Recommendations for the 2nd round* Tentative agreement is agreeable.

Issue 3-8-2: Configuration for RSRP and RSRQ test casesOnly a single company provide its view regarding this topic. Based on the contribution, the following is proposed to be agreed:Tentative agreements: * NR-U RSRP and RSRQ measurement accuracy test cases are designed for following test configuration:

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations in each supported band |

* Cell specific test parameters should contain following new or modified parameters to account for the LBT impact:
	+ DL CCA model
	+ UL CCA model
	+ DBT Window Configuration
	+ DL CCA probability PCCA\_DL
	+ UL CCA probability PCCA\_UL
	+ SSB configuration
	+ New RMCs

Recommendations for the 2nd round* Tentative agreements are agreeable.
 |
| **Sub-topic#3-9** | Sub-topic 3-9: TCI state switchingIssue 3-9-1: Timing difference between RSs in two TCI statesAt least one company commented that this test case is low priority and definition of that TC is still FFS. Therefore, we should decide if we include the test case and adopt Option 1, or not to include the test case as in Option 2. Candidate options:* Option 1: Introduce the timing difference between the RS in the two TCI states in the TCI state switching test cases, where the exact value needs further discussion.
	+ Confirm on the testability of Proposal 1.
* Option 2: Since TCI switching test case is low priority, not to include this test case.

Recommendations for the 2nd round* Decide between Option 1 and 2.
 |

### 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)

*Moderator can provide summary of 2nd round here. Note that recommended decisions on tdocs should be provided in the section titled ”Recommendations for Tdocs”.*

# Topic #4: Test case list and work split

### Sub-topic 4-2: Test case list

**Issue 4-1-1: Test case list**

* Companies are asked to provide feedback in the way explained in Table 4-1-1.1 to the test case list in Table 4-1-1.2.

**Table 4-1-1.1: Instructions on how to fill Table 4-1-1.2**

|  |  |
| --- | --- |
| Column | Required feedback (please use company name) |
| Volunteer | Please indicate if your company is willing to volunteer for any of the blue marked test cases |
| Volunteer | Please provide a CR based on the existing volunteering for the next RAN4 meeting, or remove your company name in the light blue marked test cases if volunteering no longer applies. |
| Test case should be included | Please indicate in this column your company support for including some of the FFS test cases marked orange. |
| Test case should NOT be included | Please indicate in this column your company objection for introducing some of the FFS test cases marked orange OR objection for any of the already agreed test cases. |

**Table 4-1-1.2: Test case list for volunteering and indicating company support/objection for FFS test cases**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Group of requirements** | **Test cases** | **Clarification** | **Requirements section** | **Agreed** | **Volunteer** | **Endorsed sections** |
| RRC\_IDLE, cell re-selection | NR-U -> NR-U | intra-frequency | 4.2A | Yes | Ericsson | A.11.1.1.1.1 |
| inter-frequency | Yes | A.11.1.1.1.2 |
| NR(FR1) -> NR-U  |   | Yes | A.11.1.3  |
|  NR-U -> NR(FR1) |   | Yes | A.11.1.2  |
| NR-U - > E-UTRAN (FDD,TDD) |   | Yes |  A.11.1.4 |
| E-UTRAN (FDD,TDD) -> NR-U |   | TS 36.133 | Yes |  Ericsson | A.12.1.1.1 |
| HO (delay and interruptions) | NR-U-> NR-U | intra-frequency, known | 6.1B | Yes |  Huawei | A.11.2.1.1 |
| intra-frequency, unknown | Yes | A.11.2.1.2 |
| inter-frequency, unkown | Yes | A.11.2.1.3 |
| NR(FR1) -> NR-U | known | 6.1B | Yes |  Ericsson |   |
| unkown | Yes |   |
| NR-U -> NR(FR1) | known |   | Yes | Nokia  |   |
| unknown | 6.1.1.2 | Yes | A.12.2  |
| NR-U - > E-UTRAN (FDD,TDD) |   | 6.1.2.1 | Yes | Ericsson |   |
| E-UTRAN (FDD,TDD) -> NR-U |   | TS 36.133 | Yes |  Nokia |   |
| RRC Re-establishment | NR-U-> NR-U |   | 6.2.1A | Yes |  Nokia | A.11.2.2.1.1A.11.2.2.1.2A.11.2.2.1.3 |
| NR(FR1) -> NR-U |   | Yes |  [Huawei/Ericsson] |  A.11.2.2.1.4 A.11.2.2.1.5 A.11.2.2.1.6 |
| Random access | Contention-based and non-contention based RA for both 2-step and 4-step RA types: |   | 6.2.2A [1] |   |   |   |
| ·        to NR-U PCell |   | Yes | Ericsson | A.10.1.1.1  |
| ·        to NR-U PSCell |   | Yes | Ericsson | A.11.2.2.2  |
| RRC Connection Release with Redirection | ·        NR-U-> NR-U |   | 6.2.3.2.3 | Yes |  Huawei | A.11.2.2.3.1 |
| ·        NR(FR1) -> NR-U |   | Yes | Ericsson |   |
| Timing (transmit timing) | ·        NR-U PCell |   | 7.1, 7.3 | Yes | MTK | A.11.3.1.1 |
| ·        NR-U PSCell |   | Yes | Ericsson | A.10.2.1.1 |
| Timing (timing advance) | ·        NR-U PCell |   | Yes | Ericsson | A.11.3.2.1 |
| ·        NR-U PSCell |   | Yes | A.10.2.2.1 |
| BWP switching delay and interruptions  | ·       E-UTRAN – NR-U PSCell UL active BWP switch based on persistent UL LBT failure |   | 8.6 | Yes | Ericsson | A.10.3.5.1 |
| ·       NR-U – NR-U PCell UL active BWP switch based on persistent UL LBT failure |   | Yes | A.11.4.5.1 |
| Legacy DCI/timer/RRC-based BWP switching on NR-U SCell, with: |  |   |   |   |
| ·        NR PCC (PCC) |  | Yes |  Ericsson  |   |
| ·        NR-U PCC |  | Yes | Ericsson  |   |
| ·        NR-U PSCC and E-UTRAN PCC (FDD, TDD) |  | Yes |  Ericsson  |   |
| RLM (in-syn and out-of-sync) | ·        On NR-U PSCC, with E-UTRAN PCC (FDD,TDD) | OOS, non-DRX | 8.1A | Yes | Ericsson | A.10.3.1.2 |
| IS, non-DRX | Yes | A.10.3.1.3 |
| OOS, DRX | Yes | A.10.3.1.4 |
| IS, DRX | Yes | A.10.3.1.5 |
| ·        On NR-U PCC | OOS, non-DRX | Yes | A.11.4.1.2 |
| IS, non-DRX | Yes | A.11.4.1.3 |
| OOS, DRX | Yes | A.11.4.1.4 |
| IS, DRX | Yes | A.11.4.1.5 |
| BM (beam failure detection and link recovery) | ·        On NR-U PCC | nonDRX | 8.5A | Yes | Ericsson | A.11.4.4.1 |
| DRX | A.11.4.4.2 |
| ·        On NR-U PSCC, with E-UTRAN PCC (FDD,TDD) | nonDRX | Yes | A.10.3.4.1 |
| DRX | A.10.3.4.2 |
| SCell activation/deactivation delay | ·        NR PCC (FR1) | known | 8.3A | Yes |  Ericsson | A.9.2.2.1/2 |
| unknown | Yes | A.9.2.2.3 |
| ·        NR-U PCC | known | Yes | A.11.4.3.1/2 |
| unknown | Yes | A.11.4.3.3 |
| ·        NR-U PSCC and E-UTRAN PCC (FDD, TDD) | known | Yes | A.10.3.3.1/2 |
| unknown | Yes | A.10.3.3.3 |
| PSCell addition/release delay |  NR-U PSCell with E-UTRA PCC | konwn | TS 36.133 | Yes |  Huawei |   |
| Active TCI state switching delay | For known and unknown target TCI state in NR-U, on: |   | 8.10A |   |   |   |
| ·        NR-U PCC |   | FFS |   |   |
| ·        NR-U SCC, with NR PCC (FR1) |   | FFS |   |   |
| ·        NR-U PSCC, with E-UTRAN PCC (FDD, TDD) |   | FFS |   |   |
| Interruptions | Due to NR-U SCell activation/deactivation/addition/release, with: |   | 8.2.1, 8.2.2 |     |
| ·        NR PCC (FR1) |   | Yes | Ericsson | A.9.2.1.1 |
| ·        NR-U PCC |   | Yes | A.11.4.2.1 |
| ·        NR-U PSCC and E-UTRAN PCC (FDD,TDD) |   | Yes | A.10.3.2.1 |
| Due to inter-RAT SFTD measurements between: |   | TS 36.133 |   |   |   |
| ·        NR-U PCell and E-UTRAN PCell (FDD,TDD) |   | Yes |   |   |
| Due to NR-U PSCell addition/release, with: |   | TS 36.133 | Yes |   |   |
| ·        E-UTRA PCell |   | Yes |   |   |
| 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) |   | Yes | Ericsson | A.9.3.1.1/2/3/4 |
| ·        NR-U PCC |   | Yes | A.11.5.1.1/2/3/4 |
| ·        NR-U SCC, with NR-U PCC |   | Yes | A.11.5.1.5/6/7/8 |
| ·        NR-U PSCC, with E-UTRAN PCC (FDD,TDD) |   | Yes | A.10.4.1.1/2/3/4 |
| ·        NR-U SCC measurements, with E-UTRAN PCC (FDD,TDD) and NR-U PSCC |   | Yes | A.10.4.1.5/6/7/8 |
| L1-RSRP measurements on: |   | 9.5.4A |   |   |   |
| ·        NR-U SCC, with NR PCC (FR1) |  Non-DXR | Yes | Ericsson | A.9.3.3.1 |
| DRX | A.9.3.3.2 |
| ·        NR-U PCC |  Non-DXR | Yes | A.11.5.4.1 |
| DRX | A.11.5.4.2 |
| ·        NR-U SCC, with NR-U PCC |  Non-DXR | Yes | A.11.5.4.3 |
| DRX | A.11.5.4.4 |
| ·        NR-U PSCC, with E-UTRAN PCC (FDD,TDD) |  Non-DXR | Yes | A.10.4.3.1 |
| DRX | A.10.4.3.2 |
| ·        NR-U SCC measurements, with E-UTRAN PCC (FDD,TDD) and NR-U PSCC |  Non-DXR | Yes | A.10.4.3.3 |
| DRX | A.10.4.3.4 |
| Intra-frequency RSSI measurements on: |   | 9.2A.7.1 |   |   |   |
| ·        NR-U SCC, with NR PCC (FR1) |   | Yes | Ericsson | A.9.3.1.5 |
| ·        NR-U PCC |   | Yes | A.11.5.1.9 |
| ·        NR-U SCC, with NR-U PCC |   | Yes | A.11.5.1.11 |
| ·        NR-U PSCC, with E-UTRAN PCC (FDD,TDD) |   | Yes | A.10.4.1.9 |
| ·        NR-U SCC measurements, with E-UTRAN PCC (FDD,TDD) and NR-U PSCC |   | Yes | A.10.4.1.11 |
| Intra-frequency CO measurements on: |   | 9.2A.7.2 |   |   |   |
| ·        NR-U SCC, with NR PCC (FR1) |   | Yes | Ericsson | A.9.3.1.6 |
| ·        NR-U PCC |   | Yes | A.11.5.1.10 |
| ·        NR-U SCC, with NR-U PCC |   | Yes | A.11.5.1.12 |
| ·        NR-U PSCC, with E-UTRAN PCC (FDD,TDD) |   | Yes | A.10.4.1.10 |
| ·        NR-U SCC measurements, with E-UTRAN PCC (FDD,TDD) and NR-U PSCC |   | Yes | A.10.4.1.12 |
| 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) |   | Yes | Nokia  |   |
| ·        NR-U inter-frequency, with NR-U PCC |   | Yes |   |
| ·        NR-U inter-frequency, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) |   | Yes |   |
| Inter-frequency RSSI measurements on:  |   | 9.3A.8 |   |   |   |
| ·        NR-U inter-frequency, with NR PCC (FR1) |   | Yes | Ericsson | A.9.3.2.1 |
| ·        NR-U inter-frequency, with NR-U PCC |   | Yes | A.11.5.2.1 |
|
| ·        NR-U inter-frequency, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) |   | Yes | A.10.4.2.1 |
| Inter-frequency CO measurements on:  |   | 9.3A.9 |   |   |   |
| ·        NR-U inter-frequency, with NR PCC (FR1) |   | Yes | Ericsson | A.9.3.2.2 |
| ·        NR-U inter-frequency, with NR-U PCC |   | Yes | A.11.5.2.2 |
| ·        NR-U inter-frequency, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) |   | Yes | A.10.4.2.2 |
|   | Inter-RAT SFTD between: |   | TS 36.133 |   |   |   |
|   |   |
|   | ·        E-UTRAN PCell (FDD,TDD) and NR-U neighbor |   | Yes | Ericsson | A.12.4.1.1 |
|   | NOTE: under the condition of stationary paths |
|   | NR-U-E-UTRA RSRP/RSRQ (needed for HO): |   | 9.4.2, 9.4.3 |   |   |   |
|   | ·        On E-UTRA (FDD,TDD), with NR-U PCC |   | Yes |   |   |
|   | ·        On E-UTRA (FDD,TDD), with NR-U PSCC |   | Yes |   |   |
|   | E-UTRA-NR-U SS-RSRP/SS-RSRQ/SS-SINR: |   | TS 36.133 |   |   |   |
|   | ·        On NR-U non-serving neighbor, with E-UTRA (FDD,TDD) PCC |  With/without index detection with/without DRX | Yes | Huawei  | A.12.4.2.1/2/3/4 |
|   | ·        On NR-U non-serving neighbor, with E-UTRA (FDD,TDD) PCC and NR-U PSCC |   | Yes |   |
|   | E-UTRA-NR-U RSSI/CO: |   | TS 36.133 |   |   |   |
| Inter-RAT measurement procedure (SFTD, E-UTRA-NR-U SS-RSRP/SS-RSRQ/SS-SINR and RSSI/CO, NR-U-E-UTRA RSRP/RSRQ) | ·        On NR-U non-serving, with E-UTRA (FDD,TDD) PCC |   | Yes | Ericsson | A.12.4.2.5/6 |
|   | ·        On NR-U non-serving frequency, with E-UTRA (FDD,TDD) PCC and NR-U PSCC |   | Yes |   |
| 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) |   | Yes | Huawei  | A.9.4.1.1 |
| ·        NR-U PCC |   | Yes | A.11.6.1.1 |
| ·        NR-U SCC, with NR-U PCC |   | Yes | A.11.6.1.2 |
| ·        NR-U PSCC, with E-UTRAN PCC (FDD,TDD) |   | Yes |   |
| ·        NR-U SCC, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) |   | Yes |   |
| Intra-frequency absolute accuracies for SS-RSRQ on: |   | [10.1.29] |   |   |   |
| ·        NR-U SCC, with NR PCC (FR1) |   | Yes |   |   |
| ·        NR-U PCC |   | Yes |   |   |
| ·        NR-U SCC, with NR-U PCC |   | Yes |   |   |
| ·        NR-U PSCC, with E-UTRAN PCC (FDD,TDD) |   | Yes |   |   |
| ·        NR-U SCC, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) |   | Yes |   |   |
| Intra-frequency absolute accuracies for SS-SINR on: |   | [10.1.31] |   |   |   |
| ·        NR-U SCC, with NR PCC (FR1) |   | Yes |   |   |
| ·        NR-U PCC |   | Yes |   |   |
| ·        NR-U SCC, with NR-U PCC |   | Yes |   |   |
| ·        NR-U PSCC, with E-UTRAN PCC (FDD,TDD) |   | Yes |   |   |
| ·        NR-U SCC, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) |   | Yes |   |   |
| Absolute and relative accuracies for L1-RSRP on: |  | [10.1.33] |   |   |   |
| ·        NR-U SCC, with NR PCC (FR1) |  | Yes | MTK |   |
| ·        NR-U PCC |  | Yes |   |
| ·        NR-U SCC, with NR-U PCC |  | Yes |   |
| ·        NR-U PSCC, with E-UTRAN PCC (FDD,TDD) |  | Yes |   |
| ·        NR-U SCC, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) |  | Yes |   |
| Intra-frequency RSSI on: |   | [10.1.34.1] |   |   |   |
| ·        NR-U SCC, with NR PCC (FR1) |   | Yes | Apple  |   |
| ·        NR-U PCC |   | Yes |   |
| ·        NR-U SCC, with NR-U PCC |   | Yes |   |
| ·        NR-U PSCC, with E-UTRAN PCC (FDD,TDD) |   | Yes |   |
| ·        NR-U SCC, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) |   | Yes |   |
| Intra-frequency CO on: |   | [10.1.35.1] |   |   |   |
| ·        NR-U SCC, with NR PCC (FR1) |   | Yes | Apple  |   |
| ·        NR-U PCC |   | Yes |   |
| ·        NR-U SCC, with NR-U PCC |   | Yes |   |
| ·        NR-U PSCC, with E-UTRAN PCC (FDD,TDD) |   | Yes |   |
| ·        NR-U SCC, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) |   | Yes |   |
| 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) |   | Yes | MTK |   |
| ·        NR-U neighbor, with NR-U PCC |   | Yes |   |
| ·        NR-U neighbor, with NR-U PSCC, with E-UTRAN PCC (FDD,TDD) |   | Yes |   |
| Inter-frequency absolute and relative accuracies for SS-RSRQ on: |   | [10.1.30] |   |   |   |
| ·        NR-U neighbor, with NR PCC (FR1) |   | Yes |   |   |
| ·        NR-U neighbor, with NR-U PCC |   | Yes |   |   |
| ·        NR-U neighbor, with NR-U PSCC, with E-UTRAN PCC (FDD,TDD) |   | Yes |   |   |
| Inter-frequency absolute and relative accuracies for SS-SINR on: |   | [10.1.32] |   |   |   |
| ·        NR-U neighbor, with NR PCC (FR1) |   | Yes |   |   |
| ·        NR-U neighbor, with NR-U PCC |   | Yes |   |   |
| ·        NR-U neighbor, with NR-U PSCC, with E-UTRAN PCC (FDD,TDD) |   | Yes |   |   |
| Inter-frequency RSSI on: |   | [10.1.34.2] |   |   |   |
| ·        NR-U neighbor, with NR PCC (FR1) |   | Yes | Apple  |   |
| ·        NR-U neighbor, with NR-U PCC |   | Yes |   |
| ·        NR-U neighbor, with NR-U PSCC, with E-UTRAN PCC (FDD,TDD) |   | Yes |   |
| Inter-frequency CO on: |   | [10.1.35.2] |   |   |   |
| ·        NR-U neighbor, with NR PCC (FR1) |   | Yes | Apple  |   |
| ·        NR-U neighbor, with NR-U PCC |   | Yes |   |
| ·        NR-U neighbor, with NR-U PSCC, with E-UTRAN PCC (FDD,TDD) |   | Yes |   |
| Accuracy for inter-RAT measurements (SFTD, E-UTRA-NR-U SS-RSRP/SS-RSRQ/SS-SINR and RSSI/CO, NR-U-E-UTRA RSRP/RSRQ) | Inter-RAT SFTD between: |   | TS 36.133 |   |   |   |
| ·        E-UTRAN PCell (FDD,TDD) and NR-U neighbor |   | Yes | Ericsson | A.12.5.1.1 |
| NOTE: under the condition of stationary paths |
| NR-U-E-UTRA RSRP with: |   | 10.2.2002 |   |   |   |
| ·        NR-U PCC |   | Yes |   |   |
| ·        NR-U PSCC |   | Yes |   |   |
| NR-U-E-UTRA RSRQ with: |   | 10.2.2003 |   |   |   |
| ·        NR-U PCC |   |   | Yes |   |   |
| ·        NR-U PSCC |   |   | Yes |   |   |
| E-UTRA-NR-U SS-RSRP/SS-RSRQ/SS-SINR: |   | TS 36.133 |   |   |   |
| ·        On NR-U neighbor, with E-UTRA (FDD,TDD) PCC |   | Yes |   |   |
| ·        On NR-U neighbor, with E-UTRA (FDD,TDD) PCC and NR-U PSCC |   | Yes |   |   |
| E-UTRA-NR-U RSSI/CO: |   | TS 36.133 |   |   |   |
| ·        On NR-U neighbor, with E-UTRA (FDD,TDD) PCC |   | Yes | Ericsson |   |
| ·        On NR-U neighbor, with E-UTRA (FDD,TDD) PCC and NR-U PSCC |   | Yes | Ericsson |   |

* Recommended WF:
	+ Update the test case list provided based on the input in Table 4-1-1.2.

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub-topic 4-2: Test case list:Please fill your input directly to Table 4-1-1.2. |

### 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.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
|  |
|  |  |
|  |
|  |

# Recommendations for Tdocs

## 1st round

**New tdocs**

|  |  |  |
| --- | --- | --- |
| **Title** | **Source** | **Comments** |
| WF on … | YYY |  |
| LS on … | ZZZ | To: RAN\_X; Cc: RAN\_Y |
| WF on general test configurations for NR-U RRM performance requirements | Nokia |  |
| WF on LBT models for NR-U RRM performance requirements | Qualcomm |  |
| WF on test case list for NR-U | Ericsson |  |
| LS on NR-U Test Cases subject to statistical testing  | Nokia | To: RAN\_5; Cc:  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation**  | **Comments** |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
| R4-2110962 | *DraftCR 38.133 NR-U conditions* | *Ericsson* | Return to | *No comments in the 1st round* |
| R4-2110968 | *CR 36.133 Correction of accuracy requirements for NR-U bands* | *Ericsson* | Return to | *No comments in the 1st round* |
| R4-2110326 | *CR on inter-RAT measurement accuracy for NR-U R16* | *Huawei* | Return to | *No comments in the 1st round* |
| R4-2110781 | *Draft CR: Update of RMC for NR-U test cases* | *Ericsson* | Revised |  |
| [R4-2109278](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109278.zip) | *Requirement classification for statistical testing for TCs with CCA* | *Nokia* | Return to |  |
| [R4-2109276](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109276.zip) | *Draft CR on CCA model for NR-U* | *Nokia* | Revised | *Content of R4-2111305 to be merged to this CR* |
| [R4-2111305](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111305.zip) | *Correction to DL/UL CCA models in 38.133* | *Ericsson* | Merged to [R4-2109276](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109276.zip) | *As per comments of Ericsson and Nokia* |
| [R4-2111242](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111242.zip) | *Correction to cell reselection test cases for NR-U* | *Ericsson* | Revised |  |
| R4-2109279 | *Draft TC NR-U Handover test cases* | *Nokia* | Return to |  |
| R4-2110329 | *Draft CR on HO test cases for NR-U* | *Huawei* | Revised |  |
| R4-2111243 | *Correction to handover test cases for NR-U* | *Ericsson* | Revised |  |
| R4-2109280 | *Draft TC RRC re-establishment with CCA* | *Nokia* | Revised |  |
| R4-2110330 | *Draft CR on RRC Re-establishment for NR-U from NR to NRU* | *Huawei* | Revised |  |
| R4-2110331 | *Draft CR on TC of RRC connection release with redirection for NR-U* | *Huawei* | Revised |  |
| R4-2111307 | *RRC re-establishment tests from NR to NR-U in 38.133* | *Ericsson* | Revised |  |
| R4-2109281 | *Random Access test cases with CCA* | *Nokia* | Revised |  |
| R4-2110653 | *Draft CR: Random access procedure test cases for NR-U* | *Ericsson* | Revised |  |
| R4-2111308 | *Correction to UE transmit timing tests* | *Ericsson* | Revised |  |
| R4-2111309 | *Correction to BWP switching with consistent UL LBT failures* | *Ericsson* | Revised |  |
| R4-2110332 | *Draft CR on PSCell addtion for NR-U* | *Huawei* | Revised |  |
| R4-2110963 | *NR-U SCell activation TC* | *Ericsson* | Revised |  |
| R4-2110964 | *NR-U Other interruption TC* | *Ericsson* | Revised |  |
| R4-2110652 | *Draft CR: Update of beam management test cases for NR-U* | *Ericsson* | Revised |  |
| R4-2109277 | *Draft TC NR-U inter-frequency measurements* | *Nokia* | Return to |  |
| R4-2109853 | *Draft CR of test cases on measurement accuracy under CCA for inter-frequency SS-RSRP and L1-RSRP* | *Mediatek* | Merged with R4-2111245 |  |
| R4-2110333 | *Draft CR of test cases for Inter-RAT measurement for NR-U* | *Huawei* | Revised |  |
| R4-2110965 | *NR-U SFTD procedure TC* | *Ericsson* | Revised |  |
| R4-2110334 | *Draft CR of test cases for Intra-frequency measurement accuracy for NR-U* | *Huawei* | Merged with R4-2111245 |  |
| R4-2111245 | *RSRP/RSRQ measurement accuracy test for NR-U in EN-DC* | *Ericsson* | Revised | *Content of R4-2110334 and R4-2109853 to be merged in this CR following Ericsson’s proposal on the first round.*  |
| R4-2109302 | *TCs for RSSI and CO measurement accuracy in NR-U R16* | *Apple* | Revised |  |
| R4-2110966 | *NR-U SFTD accuracy TC* | *Ericsson* | Revised |  |

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics incl. existing and new tdocs.
2. For the Recommendation column please include one of the following:
	1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
	2. Other documents: Agreeable, Revised, Noted
3. For new LS documents, please include information on To/Cc WGs in the comments column
4. Do not include hyper-links in the documents

## 2nd round

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation**  | **Comments** |
| R4-210xxxx | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
| R4-210xxxx | WF on … | YYY | Agreeable, Revised, Noted |  |
| R4-210xxxx | LS on … | ZZZ | Agreeable, Revised, Noted |  |
|  |  |  |  |  |

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics.
2. For the Recommendation column please include one of the following:
	1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
	2. Other documents: Agreeable, Revised, Noted
3. Do not include hyper-links in the documents