**3GPP TSG-RAN WG4 Meeting # 110 R4-2402649**

**Athens, GR, Feb. 26 – Mar. 1, 2024**

**Agenda item:** 8.20.7

**Source:** Moderator (CATT)

**Title:** Topic summary for [110][309] NR\_netcon\_repeater\_RFConformance

**Document for:** Information

# Introduction

This contribution is the summary for the topic [309] NR\_netcon\_repeater\_RFConformance. It covers the contributions in AI 8.20.3.

# Topic #1: General

## Companies’ contributions summary

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| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2402515 | ZTE | **Proposal 1:** to use the TS 38.115-1/2 as baseline spec to specify the RF conformance testing requirement for NCR  **Proposal 2:** to follow the same principle as agreed for core requirement of NCR TS38.106 to draft the conformance testing specification. Please review the attached spec structure of NCR. |

## Open issues summary

**Issue 1-1: New Spec needed?**

* Proposals
  + Use the TS 38.115-1/2 as baseline spec to specify the RF conformance testing requirement for NCR
* Recommended WF
  + **Moderator except this is agreeable without discussion:**
    - To use the TS 38.115-1/2 as baseline spec to specify the RF conformance testing requirement for NCR

**Issue 1-2: Spec structure**

* Proposals
  + To follow the same principle as agreed for core requirement of NCR TS38.106 to draft the conformance testing specification. Please review the attached spec structure of NCR
* Recommended WF
  + **Moderator except this is agreeable without discussion:**
    - To follow the same principle as agreed for core requirement of NCR TS 38.106 to draft the conformance testing specification. Please review the attached spec structure of NCR

**Issue 1-3: Work split**

* Proposals
  + Please check R4-2402515
* Recommended WF
  + None, rapporteur could trigger the work split procedure under the corresponding thread

# Topic #2: Manufacturing declaration

## Companies’ contributions summary

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| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2400075 | CATT | **Proposal 9: The manufacturer shall declare a set of the input/output pairs to indicate the mapping between input-side and output-side TAB connectors. The set of declared input/output pairs should include all TAB connectors. All declarations need to be tested.** |
| R4-2402514 | ZTE | **Proposal 4:** to consider the manufacture declaration for NCR as shown in Table 2.3.1 and Table 2.3.2 as starting point. |

## Open issues summary

**Issue 2-1: Relationship mapping between input connectors and output connectors for Type 1-H NCR-Fwd**

* Background
  + Some companies believed that the mapping between I/O connectors of type 1-H NCR-Fwd should be indicated. The conclusion from core part discussion shown as below:

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| WF: Core part requirement is defined based on input/output pair. Declaration for input and output to be further discussed in the performance part. |

* Proposals
  + Option 1: (CATT)
    - Declare a set of the I/O pairs. This set should include all TABs; all declared pairs need to be tested.
* Recommended WF
  + Discuss the above proposals in the meeting.

**Issue 2-2: Manufacture declaration table**

* Option 1 (ZTE):
  + To consider the manufacture declaration for NCR as shown in Table 2.3.1 and Table 2.3.2 as starting point.
* Recommended WF
  + Discuss the above proposals in the meeting

# Topic #3: Test configuration and Test Model

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2402514 | ZTE | **Proposal 1:** not to consider the LA NCR-MT SEM requirement to be tested under edge\_1PRB\_left and edge\_1PRB\_right RB allocations with max Tx power. |
| R4-2402247 | Nokia | **Proposal 1: It is proposed to reuse FR1 UL repeater test models for NCR-MT type 1-C and NCR-MT type 1-H.**  **Proposal 2: It is proposed to reuse FR2 UL repeater test models for NCR-MT type 2-O.**  **Proposal 3: It is proposed to add to TM1.1 for both FR1 and FR2 NCR-MT receiver sensitivity requirement.**  **Proposal 4: It is proposed for NCR-MT Rx intermodulation test configuration to modify position of f2 for CW interfering signal.** |

## Open issues summary

**Issue 3-1: testing on edge PRB**

* Background: Some companies believed that for LA NCR-MT, the SEM testing on edge PRBs with max Tx power should be conducted
* Option 1(ZTE):
  + Not to consider the LA NCR-MT SEM requirement to be tested under edge\_1PRB\_left and edge\_1PRB\_right RB allocations with max Tx power.
* Recommended WF
  + Discuss the above proposals in the meeting

**Issue 3-2: Modification on the CW signal position of NCR-MT Rx IMD test**

* Proposals in R4-2402247 (Nokia):
  + For NCR-MT Rx IMD test configuration to modify position of f2 for CW interfering signal.

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* Recommended WF
  + **Moderator except this is agreeable without discussion:**
    - For NCR-MT Rx IMD test configuration to modify position of f2 for CW interfering signal

**Issue 3-3: Test model for NCR-MT**

* Proposals
  + Option 1 (Nokia)
    - Reuse FR1 UL repeater test models for NCR-MT type 1-C/H
    - Reuse FR2 UL repeater test models for NCR-MT type 2-O
* Recommended WF
  + **Moderator except this is agreeable without discussion:**
    - Reuse FR1 UL repeater test models for NCR-MT type 1-C/H
    - Reuse FR2 UL repeater test models for NCR-MT type 2-O

**Issue 3-4: Rx REFSENS for NCR-MT**

* Proposals
  + Option 1 (Nokia)
    - It is proposed to add to TM1.1 for both FR1 and FR2 NCR-MT receiver sensitivity requirement
* Recommended WF
  + **Moderator except this is agreeable without discussion:**
    - It is proposed to add to TM1.1 for both FR1 and FR2 NCR-MT receiver sensitivity requirement

# Topic #4: Measurement Uncertainty and Test Tolerance

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2402514 | ZTE Corporation | **Proposal 2:** to use the MU and TT value defined in Rel-17 NCR as baseline for NCR-Fwd type 1-C/H and type 2-O.  **Proposal 3:** for WA NCR-MT, MU and TT values could be reused from BS MU/TT requirement as defined in TS 38.141-1/2, however for LA NCR-MT, the test tolerance requirement could be reused from TS38.521-1/2. |
| R4-2400075 | CATT | **Proposal 1: For *NCR type 1-H*, the test uncertainty should be applied to the measured value (when the requirement is applied to each TAB connector) or the test uncertainty should be applied to the sum of the measured power for each TAB connector in the group (when the requirement is applied to a group of TAB connectors).**  **Proposal 2: For NCR type 1-C and 1-H Fwd conducted requirements, existing MU for repeater 1-C in TS 38.115-1 can be reused.**  **Proposal 3: For Wide Area NCR-MT type 1-C and 1-H conducted requirements, MU for IAB-MT type 1-H (Below 6 GHz) in TS 38.176-1, and MU for BS Type 1-H (6 GHz < f ≤ 7.125 GHz) in TS 38.141-1 could be reused accordingly.**  **Proposal 4: For Local Area NCR-MT type 1-C and 1-H conducted requirements, MU for IAB-MT type 1-H (Below 6 GHz) in TS 38.176-1, and MU for BS Type 1-H (6 GHz < f ≤ 7.125 GHz) in TS 38.141-1 could be reused accordingly.**  **Proposal 5: For NCR-Fwd type 1-H radiated requirements, existing MU for BS type 1-H in TS 38.141-2 can be reused.**  **Proposal 6: For NCR-Fwd type 2-O radiated requirements, existing MU for repeater type 2-O in TS 38.115-2 can be reused.**  **Proposal 7: For Wide Area NCR-MT type 1-H radiated requirements, MU for IAB-MT type 1-H (Below 6 GHz) in TS 38.176-2, and MU for of 6 GHz < f ≤ 7.125 GHz in TS 38.141-2 could be reused accordingly.**  **Proposal 8: For NCR-MT type 2-O radiated requirements, existing MU for IAB-MT type 2-O in TS 38.176-2 can be reused.** |

## Open issues summary

**Issue 4-1: MU & TT for NCR-Fwd**

* Proposals
  + Option 1: (CATT & ZTE)
    - Reuse Rel-17 repeater MU &TT as baseline for NCR-Fwd type 1-C/H and type 2-O
* Recommended WF
  + **Moderator except this is agreeable without discussion:**
    - Reuse Rel-17 repeater MU &TT as baseline for NCR-Fwd type 1-C/H and type 2-O

**Issue 4-2: MU & TT for NCR-MT**

* Proposals
  + Option 1: (CATT)
    - Reuse BS/IAB MU &TT for NCR-MT
  + Option 2: (ZTE)
    - Reuse BS MU &TT for WA NCR-MT, for LA NCR-MT, reuse TT from TS 38.521 (UE)
* Recommended WF
  + **Moderator except this is agreeable without discussion:**
    - Reuse BS MU &TT for WA NCR-MT
  + **Online discussion required:**
    - For LA NCR-MT, reuse relevant MU/TT from BS or UE.

# Topic #5: EMC conformance

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2401144 | ZTE | **Proposal 1:** Table 1 can be the baseline for future NCR EMC Perf discussion and revision work. |
| R4-2401148 | ZTE | **Observation 1:** In TS38.106, NCR-Fwd and NCR-MT will follow the NR-ARFCN and channel raster specified by BS and UE respectively.  **Observation 2:** The spurious emissions limits for NCR-Fwd type 1-C/1-H/2-O and NCR-MT type 1-C/1-H/2-O are determined and published in latest TS38.106.  **Proposal 1:** The wanted RF input signal nominal frequency of NCR-Fwd and NCR-MT shall follow the BS’s NR-ARFCN and UE’s NR-ARFCN respectively.  **Proposal 2:** The performance metrics for NCR-Fwd and NCR-MT can be power accuracy and throughput respectively, with the same test level as NR repeater (FR1: ±2dB, FR2: ±3dB) and BS/IAB (5%).  **Proposal 3:** It is recommended that the RSE limits for NCR EMC shall follow the limits in RF requirements, which will reuse the NR repeater’s limits for NCR-Fwd and Wide Area NCR-MT, then introduce UE’s limits for Local Area NCR-MT. |
| R4-2402246 | Nokia | **Observation 1:** During the test, the enclosure of the NCR is exposed to the RF field. Figure 1 shows the test setup for the radiated RF immunity test of the NCR, with the NCR-MT and NCR-Fwd in one enclosure. This can be seen as the preferred test method to provide a fas and efficient way to test.  **Observation 2:** If an NCR node contains separate enclosures for the NCR-MT and NCR-Fwd, the performance assessment can be performed separately for each according to the manufacturer's declaration.  **Observation 3:** When testing immunity for NCR, the communication links for the UE simulator and BS simulator should be established. In the case of NR repeaters, power accuracy and gain shall be evaluated. In the case of NCR, the control link should also be monitored from the BS interface.  **Proposal 1: During the EMC immunity tests of NCR, the power accuracy and gain were evaluated, as well as the control link between NCR-MT and BS. The control link test should be performed using a bearer with the predefined characteristics (data rate and throughput).**  **Observation 4:** RAN4 to consider defining the power accuracy and gain levels. |

## Open issues summary

**Issue 5-1: Spec structure**

* Proposals
  + Option 1: (ZTE)
    - Table 1 can be the baseline for future NCR EMC Perf discussion and revision work.
* Recommended WF
  + Discuss the above proposals in the meeting

**Issue 5-2: Wanted RF input signal nominal frequency**

* Proposals
  + Option 1: (ZTE)
    - The wanted RF input signal nominal frequency of NCR-Fwd and NCR-MT shall follow the BS’s NR-ARFCN and UE’s NR-ARFCN respectively.
* Recommended WF
  + Discuss the above proposals in the meeting

**Issue 5-3: Performance metrics**

* Proposals
  + Option 1: (ZTE)
    - The performance metrics for NCR-Fwd and NCR-MT can be power accuracy and throughput respectively, with the same test level as NR repeater (FR1: ±2dB, FR2: ±3dB) and BS/IAB (5%).
* Recommended WF
  + Discuss the above proposals in the meeting

**Issue 5-4: RSE limits**

* Proposals
  + Option 1: (ZTE)
    - It is recommended that the RSE limits for NCR EMC shall follow the limits in RF requirements, which will reuse the NR repeater’s limits for NCR-Fwd and Wide Area NCR-MT, then introduce UE’s limits for Local Area NCR-MT.
* Recommended WF
  + Discuss the above proposals in the meeting

**Issue 5-5: Immunity setup and monitoring**

* Proposals
  + Option 1: (Nokia)
    - During the EMC immunity tests of NCR, the power accuracy and gain were evaluated, as well as the control link between NCR-MT and BS. The control link test should be performed using a bearer with the predefined characteristics (data rate and throughput).
* Recommended WF
  + Discuss the above proposals in the meeting

# Annex: CRs and draft CRs to specifications

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| **T-doc number** | **Suggest status** | **Comments** |
| R4-2402245 | Revised | **- CATT:** Encountered some terminology issues (NR repeater), need for conclusion from Core session.  - [**Company**] : [Comments] |