**3GPP TSG-RAN WG4 Meeting #** **109 R4-231xxxx**

**Chicago, USA, Nov 13 – Nov 17, 2023**

**Agenda item:** 8.28.7

**Source:** Moderator (ZTE)

**Title:** Email discussion summary for [109][311] NR\_netcon\_repeater\_RF

**Document for:** Information

# Introduction

*Briefly introduce background, the scope of this email discussion (e.g. list of treated agenda items) and provide some guidelines for email discussion if necessary.*

The e-mail discussion covers RF part for NCR-fwd and NCR-MT in Rel-18 .

All contributions submitted are divided into the following Topics:

1. Study of RF core and EMC requirements covering the following agenda 8.28.1, 8.28.2.1, 8.28.2.2, 8.28.3

# Topic #1: System parameter and feature list

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| **[R4-2318308](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2318308.zip)** | CATT | Discussion on Rel-17 repeater terminology |
| **[R4-2320258](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2320258.zip)** | Nokia, Nokia Shanghai Bell | Discussion of terminology related to repeaters |
| **[R4-2320342](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2320342.zip)** | ZTE Corporation | Discussion on RAN4 feature list for NCR-MT |

## Open issues summary

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

### Sub-topic 1-1 terminology for NCR

*Sub-topic description:*

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

**Issue 1-1: draft spec skeleton**

* + Proposal 1: Rel-17 repeater should be named as RF repeater. [CATT,[R4-2318308](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2318308.zip) ]
  + Proposal 2:where the Release 17 repeater concept is referred to as NR repeater and the Release 18 concept is referred to as NR Network Controlled Repeater (NCR). [Nokia,[R4-2320258](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2320258.zip) ]
* Recommend WF
  + RF repeater for Rel-17 repeater
  + Network controlled repeater for Rel-18 repeater

### Sub-topic 1-2 NCR-MT feature list

*Sub-topic description:*

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

**Issue 1-2: NCR-MT feature list**

* Proposals
  + Proposal 1: to remove the square bracket for feature 1-3 for NCR-MT [ZTE,[R4-2320342](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2320342.zip)]
  + Proposal 2: to confirm the baseline agreement reached in R4-2316996 as agreement. [ZTE,[R4-2320342](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2320342.zip)]
* Recommend
  + Proposal 1 and proposal 2 is agreed

## Companies views’ collection for 1st round

### Open issues

Sub-topic 1-1

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| --- | --- |
| **Company** | **Comments** |
| Company A |  |
| Company B |  |

Sub-topic 1-2

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| **Company** | **Comments** |
| Company A |  |
| Company B |  |

Sub-topic 1-3

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| --- | --- |
| **Company** | **Comments** |
| Company A |  |
| Company B |  |

Sub-topic 1-4

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| --- | --- |
| **Company** | **Comments** |
| Company A |  |
| Company B |  |

# Topic #2: RF requirements for NCR-Fwd

## Companies’ contributions summary

(Cat A CRs are not listed)

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| **T-doc number** | **Company** | **Proposals / Observations** |
| **[R4-2318309](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2318309.zip)** | CATT | Discussion on RF requirement for NCR-Fwd |
| **[R4-2318311](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2318311.zip)** | CATT | CR for TS 38.106, Introduction of Operating band and channel arrangement for NCR |
| **[R4-2319645](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319645.zip)** | Ericsson | NCR RF requirements |
| **[R4-2319647](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319647.zip)** | Ericsson | Draft CR to 38.106: NCR conducted TX requirements |
| **[R4-2320167](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2320167.zip)** | NEC | Draft CR to TS 38.106: Clause 7 radiated requirement |
| **[R4-2320260](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2320260.zip)** | Nokia, Nokia Shanghai Bell | Discussion of Spurious Emissions requirements for NCR-Fwd |
| **[R4-2320343](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2320343.zip)** | ZTE Corporation | Discussion on RF requirements for NCR-Fwd |
| **[R4-2320347](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2320347.zip)** | ZTE Corporation | Draft CR of introduction of NCR into TS 38.106: Clause 1 ~4 |

## *Open issues summary*

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

### Sub-topic 2-1 RF requirement for NCR-Fwd type 1-H

**Issue 2-1 Relationship mapping between input connectors and output connectors**

* Proposals
  + Proposal 1: for NCR-Fwd type 1-H, propose to specify both options proposed in R4-2316996 in the conformance testing specification. [ZTE,[R4-2320343](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2320343.zip)]
* Option 1: to declare the relationship between input connectors and output connector for NCR-Fwd type 1-H
* Option 2: inject the signals on all input connectors and conduct the measurement at all output connectors.
  + Proposal 2: The mapping between input and output connector of type 1-H NCR-Fwd is manufacturer declaration basis. [CATT,[R4-2318309](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2318309.zip)]
  + [Proposal 3: It is proposed to take one TAB connector pair under the test and declare TAB connectors in case they are identical.](#_Toc149060207) [Nokia,[R4-2320260](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2320260.zip)]
  + Proposal 4: Define the core requirements as applying between corresponding output and input TAB connector groups. [Ericsson,[R4-2319645](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319645.zip)]
  + Proposal 5: During the performance phase, determine how to define the corresponding groups of TAB connectors. Consider whether 1-H conformance (and possibly core) is feasible in this release if a solution cannot be found. [Ericsson,[R4-2319645](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319645.zip)]

Recommended WF

* + Companies’ views are encouraged in 1st round.

## Companies views’ collection for 1st round

### Open issues

Sub-topic 2-1

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| **Company** | **Comments** |
| Company A |  |
| Company B |  |

Sub-topic 2-2

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| **Company** | **Comments** |
| Company A |  |
| Company B |  |

Sub-topic 2-3

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| --- | --- |
| **Company** | **Comments** |
| Company A |  |
| Company B |  |

Sub-topic 2-4 [please provide the comments in the excel sheet directly]

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| **Company** | **Comments** |
| Company A |  |
| Company B |  |

Sub-topic 2-5 [please provide the comments in the excel sheet directly]

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| **Company** | **Comments** |
| Company A |  |
| Company B |  |

# Topic #3: RF requirements for NCR-MT

## Companies’ contributions summary

(Cat A CRs are not listed)

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| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| **[R4-2318310](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2318310.zip)** | CATT | Discussion on RF requirement for NCR-MT |
| **[R4-2318916](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2318916.zip)** | CMCC | Draft CR for TS 38.106 to introduce conducted transmitter requirement for NCR-MT |
| **[R4-2320257](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2320257.zip)** | Nokia, Nokia Shanghai Bell, Dell Technologies | CR to TS 38.106 with Clause 9: conducted receiver requirement for NCR-MT |
| **[R4-2320344](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2320344.zip)** | ZTE Corporation | Discussion on RF requirements for NCR-MT |
| **[R4-2320348](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2320348.zip)** | ZTE Corporation | Draft CR of introduction of NCR into TS 38.106: Clause 11 |
| **[R4-2320850](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2320850.zip)** | Huawei, HiSilicon | Draft CR to TS 38.106: OTA TX requirements for NCR-MT |

## *Open issues summary*

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

### Sub-topic 3-1 RF requirements for NCR-MT

**Issue 3-1 Simultaneous reception requirement for NCR-Fwd and NCR-MT**

* Proposals
  + Proposal 1:For the simultaneous reception of NCR-MT and NCR-Fwd in NCR input intermodulation requirement, 6dB REFSENS degradation could be allowed once the intermodulation signal fall into NCR-MT bandwidth; [ZTE,[R4-2320344](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2320344.zip)]
  + Proposal 2: The receiver requirements for NCR-MT and NCR-Fwd should be defined separately. [CATT,[R4-2318310](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2318310.zip)]
  + Proposal 3: For the joint requirement of input intermodulation, RAN4 should discuss how to align the requirements of different NCR parts, and whether the requirement should be defined for NCR-Fwd or NCR-MT or both. [CATT,[R4-2318310](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2318310.zip)]
  + Proposal 4: RAN4 should discuss the test configuration and measurement setup for joint input intermodulation testing. [CATT,[R4-2318310](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2318310.zip)]
* Recommended WF
  + Companies’ views are encouraged in 1st round.

**Issue 3-2 OTA receiver requirements for FR1 LA NCR-MT**

* Proposals
  + Proposal 1: for FR1 LA NCR-MT receiver radiated requirement, to consider the following ways to define the requirement on top of conducted receiver requirement. [ZTE,[R4-2320344](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2320344.zip)]

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| **RF requirement** | **Corresponding conducted Rx requirement for FR1 LA NCR-MT** | **Radiated Rx requirement for FR1 LA NCR-MT** |
| OTA reference sensitivity | TS 38.101-1, subclause 7.3 | ΔOTAREFSENS |
| OTA maximum input level | TS 38.101-2 , subclause 7.4 | ΔOTAREFSENS |
| OTA adjacent channel selectivity | TS 38.101-1, subclause 7.5 | ΔminSENS |
| OTA blocking characteristics | TS 38.101-1, subclause 7.6 | For IBB and NBB requirement.:   * ΔOTAREFSENS * ΔminSENS   For OOBB requirement:  ΔminSENS |
| OTA spurious response | TS 38.101-1, subclause 7.7 | * ΔOTAREFSENS   ΔminSENS |
| OTA intermodulation characteristics | TS 38.101-1, subclause 7.8 | * ΔOTAREFSENS * ΔminSENS |
| OTA spurious emissions | TS 38.101-1, subclause 7.9 | Scaled with 6ddB relaxation on  top of basic receiver spurious  emission requirement. |

* Recommended WF
  + Companies’ views are encouraged in 1st round.

## Companies views’ collection for 1st round

### Open issues

Sub-topic 3-1

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| **Company** | **Comments** |
| Company A |  |
| Company B |  |

Sub-topic 3-2 [please provide the comments in the excel sheet directly]

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| **Company** | **Comments** |
| Company A |  |
| Company B |  |

Sub-topic 3-3 [please provide the comments in the excel sheet directly]

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| **Company** | **Comments** |
| Company A |  |
| Company B |  |

Sub-topic 3-4

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| **Company** | **Comments** |
| Company A |  |
| Company B |  |

# Topic #4: NCR EMC requirements

## Companies’ contributions summary

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| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| **[R4-2320843](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2320843.zip)** | Huawei, HiSilicon | General approach to the NCR EMC test configurations  **Proposal 1**: For the purpose of the EMC Emissions test configurations, do not copy-paste TC tables content from RF test specification. Instead, use detailed references to related NCR RF test specifications, pointing to specific Tx spurious emissions requirements.  **Proposal 2**: For the purpose of the EMC Immunity test configurations, do not copy-paste TC tables content from RF test specification. Instead, use detailed references to related NCR RF test specifications, pointing to specific Blocking requirements. |
| **[R4-2320845](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2320845.zip)** | Huawei, HiSilicon | Further discussion on NCR EMC open issues  **Proposal 1**: For NCR EMC Emissions requirements, its applicability shall be considered to the NCR node as a whole (i.e. NCR-Fwd and NCR-MT), irrespective of its implementation.  Related Draft CR depicting the proposal approach was submitted in [2].  **Proposal 2**: Further discuss whether multiple enclosures case is necessary for NCR node.  **Proposal 3**: Radiated immunity requirements shall apply to the NCR as a single node, covering both NCR-Fwd and NCR‑MT.  **Proposal 4**: the throughput performance criteria shall be only applicable to the NCR-Fwd, and not to the MT signalling link.  **Proposal 5**: whether there is need to defined new performance metric for MT signalling link (e.g. BER, etc.) requires further study during the Perf part. |
| **[R4-2319026](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319026.zip)** | ZTE, Nokia, Nokia Shanghai Bell, Ericsson | CR to TS 38.114 network controlled repeater EMC core |
| **[R4-2320846](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2320846.zip)** | Huawei, HiSilicon | Draft CR to TS 38.114: NCR Emissions requirements, Rel-18 |

## Open issues summary

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

### Sub-topic 4-1 EMC scope extension for NCR.

*Sub-topic description:*

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

**Issue 4-1: Test configuration for both emission and immunity test.**

* + Proposal 1: For the purpose of the EMC Emissions test configurations, do not copy-paste TC tables content from RF test specification. Instead, use detailed references to related NCR RF test specifications, pointing to specific Tx spurious emissions requirements.
  + Proposal 2: For the purpose of the EMC Immunity test configurations, do not copy-paste TC tables content from RF test specification. Instead, use detailed references to related NCR RF test specifications, pointing to specific Blocking requirements.
* Recommend WF
  + Companies’ views are encouraged during the meeting.

**Issue 4-2: Applicability overview for both emission and immunity test.**

* + Proposal 1: For NCR EMC Emissions requirements, its applicability shall be considered to the NCR node as a whole (i.e. NCR-Fwd and NCR-MT), irrespective of its implementation.

Related Draft CR depicting the proposal approach was submitted in R4-2320846.

* + Proposal 2: Further discuss whether multiple enclosures case is necessary for NCR node.
* Recommend WF
  + Companies’ views are encouraged during the meeting.

**Issue 4-3: Radiated immunity requirements applicability.**

* + Proposal 1: Radiated immunity requirements shall apply to the NCR as a single node, covering both NCR-Fwd and NCR‑MT.
  + Proposal 2: the throughput performance criteria shall be only applicable to the NCR-Fwd, and not to the MT signalling link.
  + Proposal 3: whether there is need to defined new performance metric for MT signalling link (e.g. BER, etc.) requires further study during the Perf part.
* Recommend WF
  + Companies’ views are encouraged during the meeting.

## Companies views’ collection for 1st round

### Open issues

**Issue 4-1: Core part for NR EMC**

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| **Company** | **Comments** |
| Company A |  |
| Company B |  |

## Summary for 1st round

### Open issues

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

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|  | **Status summary** |
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# Recommendations for Tdocs

## 1st round

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **New Tdoc number** | **Title** | **Source** | **Comments** |
|  | WF on … | YYY |  |
|  | LS on … | ZZZ | To: RAN\_X; Cc: RAN\_Y |
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**Existing tdocs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-22xxxxx |  | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
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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** | **Revised to** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-22xxxxx |  | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
| R4-22xxxxx |  | WF on … | YYY | Agreeable, Revised, Noted |  |
| R4-22xxxxx |  | LS on … | ZZZ | Agreeable, Revised, Noted |  |
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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

# Annex

Contact information

|  |  |  |
| --- | --- | --- |
| **Company** | **Name** | **Email address** |
|  |  |  |

Note:

1. Please add your contact information in above table once you make comments on this email thread.
2. If multiple delegates from the same company make comments on single email thread, please add you name as suffix after company name when make comments i.e. Company A (XX, XX)