3GPP TSG-RAN WG4 Meeting # 104-e revision\_of\_R4-2214037

Electronic Meeting, August 15 – August 26, 2022

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.114** | **CR** |  | **rev** | **1** | **Current version:** | **17.0.1** |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network | **x** | Core Network |  |

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|  | | | | | | | | | | |
| ***Title:*** | Draft CR to TS 38.114: exclusion bands, performance assessment, performance criteria (4.4, 5.1, 5.2, 6.1, 6.2) | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei, HiSilicon | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_repeaters-Core | | | | |  | ***Date:*** | | | 2022-08-10 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-17 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 2, 4.4, 5.1, 5.2, 6.1, 6.2 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **x** | Other core specifications | | | |  | | |
| ***affected:*** | |  | **x** | Test specifications | | | |  | | |
| ***(show related CRs)*** | |  | **x** | O&M Specifications | | | |  | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

*------------------------------ Modified section ------------------------------*

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

1. 3GPP TR 21.905: "Vocabulary for 3GPP Specifications"
2. 3GPP TS 38.106: "NR Repeater Radio Transmission and Reception"
3. 3GPP TS 38.115-1: "NR; Repeater conformance testing - Part 1: Conducted conformance testing"
4. 3GPP TS 38.115-2: "NR; Repeater conformance testing - Part 1: Radiated conformance testing"
5. CISPR 32: "Electromagnetic compatibility of multimedia equipment - Emission requirements".
6. IEC 61000‑6-1: "Electromagnetic compatibility (EMC) - Part 6-1: Generic standards - Immunity for residential, commercial and light-industrial environments".
7. IEC 61000-6-3: "Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments".
8. IEC 61000-3-2: "Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)".
9. IEC 61000-3-3: "Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection".
10. IEC 61000-3-11: "Electromagnetic compatibility (EMC) - Part 3-11: Limits – Limitation of voltage changes, voltage fluctuations and flicker in low-voltage supply systems - Equipment with rated current ≤ 75 A and subject to conditional connections".
11. IEC 61000-3-12: "Electromagnetic compatibility (EMC) - Part 3-12: Limits - Limits for harmonic currents produced by equipment connected to public low-voltage system with input current >16 A and ≤ 75 A per phase".
12. IEC 61000‑4‑2: "Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test".
13. IEC 61000‑4‑3: "Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test".
14. IEC 61000‑4‑4: "Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test".
15. IEC 61000‑4‑5: "Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test".
16. IEC 61000‑4‑6: "Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio frequency fields".
17. IEC 61000‑4‑11: "Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests".
18. IEC 61000‑4‑21: "Electromagnetic compatibility (EMC) - Part 4-21: Testing and measurement techniques - Reverberation chamber test methods".
19. ITU-R SM.329: "Unwanted emissions in the spurious domain".

[20] IEC 60050-161: "International Electrotechnical Vocabulary - Chapter 161: Electromagnetic compatibility".

[21] ETSI EN 301 489-1: "Electromagnetic Compatibility (EMC) standard for radio equipment and services - Part 1: Common technical requirements - Harmonised Standard for Electromagnetic Compatibility ".

[22] 3GPP TS 38.101-4

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## 4.4 Exclusion bands

The *exclusion band* for NR repeater is the frequency range over which no tests of radiated immunity are made in UL or DL.

The *exclusion band* for DL is defined as:

FDL,low – ΔfOBUE < f < FDL,high + ΔfOBUE

Where values of FDL,low and FDL,high are defined for each *operating band* in TS 38.106 [2], clause 5.2.

The *exclusion band* for UL is defined as:

FUL,low – ΔfOBUE < f < FUL,high + ΔfOBUE

Where values of FUL,low and FUL,high are defined for each *operating band* in TS 38.106 [2], clause 5.2.

For NR repeater capable of multi-band operation, the total *exclusion band* is a combination of the *exclusion bands* for each *operating band* supported by NR repeater.

The ΔfOBUE values for *Repeater type 1-C and Repeater type 2-O* are defined in table 4.4-1 for both DL and UL.

Table 4.4-1: ΔfOBUE offset values for NR *repeater 1-C and repeater 2-O*

|  |  |  |
| --- | --- | --- |
| NR repeater type | *Operating band* characteristics | ΔfOBUE (MHz) |
| *Repeater type 1-C* | FUL,high – FUL,low < 100 MHz, or  FDL,high – FDL,low < 100 MHz | 20 |
| 100 MHz ≤ FUL,high – FUL,low ≤ 900 MHz  100 MHz ≤ FDL,high – FDL,low ≤ 900 MHz | 60 |
| *Repeater type 2-O* | FUL\_high – FUL\_low ≤ 4000 MHz, or  FDL\_high – FDL\_low ≤ 4000 MHz | 1500 |

In case the *spatial exclusion zone* (as depicted in figure 9.2.2-1) is not used during the EMC RI testing, the exclusion band for *NR repeater type 2-O* is defined for UL and DL as:

FUL,low – ΔfRIexclusion < f < FUL,high + ΔfRIexclusion

FDL,low – ΔfRIexclusion < f < FDL,high + ΔfRIexclusion

Where the values of ΔfRIexclusion are defined in table 4.4-2.

Table 4.4-2: Maximum ΔfRIexclusion offset outside the operating band

|  |  |
| --- | --- |
| *Operating band* characteristics | ΔfRIexclusion (MHz) |
| 100 MHz ≥ FUL,high – FUL,low, or  100 MHz ≥ FDL,high – FDL,low | 60 |
| 100 MHz < FUL,high – FUL,low, or  100 MHz ≥ FDL,high – FDL,low | 200 |

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# 5 Performance assessment

## 5.1 General

The following information shall be recorded in or annexed to the test report:

- The primary functions of the radio equipment to be tested during and after the EMC testing;

- The intended functions of the radio equipment which shall be in accordance with the documentation accompanying the equipment;

- The method to be used to verify that a communications link is established and maintained;

- The user-control functions and stored data that are required for normal operation and the method to be used to assess whether these have been lost after EMC stress;

- The *ancillary equipment* to be combined with the radio equipment for testing (where applicable);

- The information about *ancillary equipment* intended to be used with the radio equipment;

- Information about the common and/or band-specific active RF components and other hardware blocks for a communication link in EUT capable of multi-band operation;

- An exhaustive list of ports (or RIBs), classified as either power or signal/control. Power ports shall further be classified as AC or DC power.

Performance assessment of a NR repeater with multiple enclosures may be done separately, according to the manufacturer's choice.

A communication link used by more than one *operating band*, shall be assessed on all *operating band*s. Communication link(s) and/or radio performance parameters for the *operating band*s can during the test be assessed simultaneously or separately for each band, depending on the test environment capability.

## 5.2 NR repeaters

The parameter used for assessment of performance of a NR repeater is the [gain] within the operating band.

## 5.3 Ancillary equipment

At the manufacturer's discretion the test may be performed on the *ancillary equipment* separately or on a representative configuration of the combination of radio and *ancillary equipment*. In each case EUT is tested against all applicable immunity and emission clauses of the present document and in each case, compliance enables the *ancillary equipment* to be used with different radio equipment.

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# 6 Performance criteria

## 6.1 Performance criteria for continuous phenomena for NR repeaters

The gain of the EUT shall be measured throughout the period of exposure of the phenomenon. The gain measured during the test shall not change from the gain measured before the test by more than ± 1 dB. At the conclusion of the test the EUT shall operate as intended with no loss of user control functions or stored data.

## 6.2 Performance criteria for transient phenomena for NR repeaters

The gain of the EUT shall be measured before the test and after each exposure. At the conclusion of each exposure the gain of the EUT shall not have changed by more than ± 1 dB. At the conclusion of the total test comprising the series of individual exposures, the EUT shall operate as intended with no loss of user control functions or stored data, as declared by the manufacturer, and the gain of the EUT shall not have changed by more than ± 1 dB.

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