3GPP TSG-RAN WG4 Meeting # 94-e-Bis DRAFT R4-2005474

Electronic Meeting, 20 – 30 Apr., 2020

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| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **38.124** | **CR** |  | **rev** | **1** | **Current version:** | **15.2.0** |  |
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| *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:*** | DraftCR to TS 38.124: correction of UE radiated spurious emissons requirement, Rel-15 | | | | | | | | | |
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| ***Source to WG:*** | Huawei | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_newRAT-Perf | | | | |  | ***Date:*** | | | 2020-04-08 |
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| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-15 |
|  | *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-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
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| ***Reason for change:*** | | Referring to the RAN4#94-e-bis meeting arrangements and guidelines shared by RAN4 chairman, the following was provided:  *• ITU submission requires no TBD or [] in core specification in the June version*  Based on this, the NR UE EMC specification was reviewed and it was found that it still requires corrections before the IMT submission.  It was observed that the radiated emissions requirement is not aligned with the NR UE RF specification. | | | | | | | | |
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| ***Summary of change:*** | | * 1: correction of the Scope, * 8.2.2: clarification of the applicability of radiated emission requirement, * 8.2.4: requirement limits alignment with the NR UE RF specification TS 38.101-1, * Removal of [] | | | | | | | | |
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| ***Consequences if not approved:*** | | Radiated emission requirement not properly specified and mis-aligned with the NR UE specification. | | | | | | | | |
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| ***Clauses affected:*** | | 1, 8.2 | | | | | | | | |
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|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | |  | | |
| ***affected:*** | |  | **X** | Test specifications | | | |  | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | |  | | |
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| ***Other comments:*** | |  | | | | | | | | |
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| ***This CR's revision history:*** | |  | | | | | | | | |

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

# 1 Scope

The present document establishes the essential EMC requirements for "3rd generation" digital cellular mobile terminal equipment and ancillary accessories in combination with a 3GPP NR user equipment (UE).

The equipment conforming to the requirements laid out in the present document and used in its intended electromagnetic environment in accordance with the manufacturer's instructions

- shall not generate electromagnetic disturbances at a level which may interfere with the intended operation of other equipment;

- has an adequate level of intrinsic immunity to electromagnetic disturbances to operate as intended;

The present document specifies the applicable EMC tests, methods of measurement, frequency ranges, applicable limits and minimum performance criteria for all types of NR UE(s) and their accessories. NR base station equipment operating within network infrastructure is outside the scope of the present document. However, the present document does cover mobile and portable equipment that is intended to be operated in a fixed location while connected to the AC mains. NR base station equipment operating within network infrastructure is covered by the technical specification TS 38.113 [2].

Requirements for the radiated emission from the enclosure port of integral antenna equipment and ancillaries are included in the present document. Technical specifications for conducted emissions from the antenna connector are found in the 3GPP specifications for the radio interface of NR UE, e.g. TS 38.101-1 [3], for the effective use of the radio spectrum.

Requirements for the radiated emissions from the enclosure port and ancillaries cover the following case:

- UE equipment supporting operations in a frequency range for which antenna connectors are available (i.e. for operations in Frequency Range 1 as defined in e.g. TS 38.101-1 [3] for the radio interface).

The immunity requirements are selected to ensure an adequate level of compatibility for apparatus in residential, commercial, light industrial and vehicular environments. The levels however, do not cover extreme cases, which may occur in any location but with low probability of occurrence.

Compliance of radio equipment to the requirements of the present document does not signify compliance to any requirement related to the use of the equipment (i.e. licensing requirements).

Compliance to the requirements of the present document does not signify compliance to any safety requirement. However, any temporary or permanent unsafe condition caused by EMC is considered as non-compliance.

*------------------------------ Next modified section ------------------------------*

## 3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1].

**Ancillary equipment:** Equipment (apparatus), used in connection with a user equipment (UE) is considered as an ancillary equipment (apparatus) if:

- the equipment is intended for use in conjunction with a UE to provide additional operational and/or control features to the UE, (e.g. to extend control to another position or location); and

- the equipment cannot be used on a stand-alone basis to provide user functions independently of a UE; and

- the UE to which it is connected, is capable of providing some intended operation such as transmitting and/or receiving without the ancillary equipment (i.e. it is not a sub‑unit of the main equipment essential to the main equipment basic functions).

**Channel bandwidth:** The RF bandwidth supporting a single NR RF carrier with the transmission bandwidth configured in the uplink or downlink of a cell. The channel bandwidth is measured in MHz and is used as a reference for transmitter and receiver RF requirements.

**Enclosure port:** Physical boundary of the apparatus through which electromagnetic fields may radiate or impinge. In the case of integral antenna equipment, this port is inseparable from the antenna port.

**Idle mode:** Idle mode is the state of User Equipment (UE) when switched on but with no Radio Resource Control (RRC) connection.

**Integral antenna:** Antenna designed to be connected directly to the equipment with or without the use of an external connector and considered to be part of the equipment. An integral antenna may be fitted internally or externally to the equipment.

**Necessary bandwidth:** For a given class of emission, the width of the frequency band which is just sufficient to ensure the transmission of information at the rate and with the quality required under specified conditions.

**Out of band emissions:** Emission on a frequency or frequencies immediately outside the necessary bandwidth, which results from, the modulation process, but excluding spurious emissions.

*------------------------------ Next modified section ------------------------------*

## 8.2 Radiated emission

### 8.2.1 General

This test is applicable to radio communications equipment and ancillary equipment.

This test shall be performed on the radio equipment and/or a representative configuration of the ancillary equipment.

### 8.2.2 Definition

This test assesses the ability of radio equipment and ancillary equipment to limit unwanted emissions from the enclosure port.

For UE equipment supporting operations in FR2 (table 4.1-1) with integral antennas only (no antenna connectors available), the EMC radiated emissions cannot be distinguished between the intended emissions nor to any spurious emissions related to these intentional transmissions:

* This test is applicable to UE equipment without integral antennas, i.e. FR1,
* For UE equipment with integral antennas only, i.e. FR2, the radiated emission is covered by radiated spurious emission requirement in TS 38.101-2 [4].

### 8.2.3 Test method

Whenever possible the site shall be a fully anechoic chamber (FAC) simulating the free-space conditions. EUT shall be placed on a non-conducting support. Mean power of any spurious components shall be detected by the test antenna and measuring receiver (e.g. a spectrum analyser).

At each frequency at which a component is detected, the EUT shall be rotated to obtain maximum response, and the effective radiated power (e.r.p.) of that component determined by a substitution measurement, which shall be the reference method. The measurement shall be repeated with the test antenna in the orthogonal polarization plane.

NOTE: Effective radiated power e.r.p. refers to the radiation of a half wave tuned dipole instead of an isotropic antenna. There is a constant difference of 2.15 dB between e.i.r.p. and e.r.p.

e.r.p. (dBm)  e.i.r.p. (dBm)  2.15 , Ref. ITU-R SM. 329 annex 1 [5]

Measurements are made with a tuned dipole antenna or a reference antenna with a known gain referenced to an isotropic antenna. Unless otherwise stated, all measurements are done as mean power (RMS).

### 8.2.4 Limits

Unless otherwise stated, the radiated spurious emission limits apply for the frequency ranges that are more than FOOB (MHz) in table 8.2.4-0 from the edge of the channel bandwidth. The radiated spurious emission limits in table 8.2.4-1 apply for all transmitter band configurations (NRB) and channel bandwidths.

The references for these requirements are ITU-R SM 329 [5], SM.1539 [18] and TS 38.101-1 [3] for FR1.

The frequency boundary and reference bandwidths for the detailed transitions of the limits between the requirements for out of band emissions and spurious emissions are based on ITU-R SM 329 [5].

These requirements are only applicable for frequencies in the spurious domain. The limits are specified in table 8.2.4-1 for UE equipment supporting operations in FR1 only.

Table 8.2.4-0: Boundary between NR out of band and general spurious emission domain

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| Channel bandwidth | OOB boundary FOOB (MHz) |
| BWChannel | BWChannel + 5 |

Table 8.2.4-1: Radiated spurious emissions requirements for UE equipment supporting operations in FR1 only

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| Frequency range | Maximum level | Measurement bandwidth | NOTE |
| 9 kHz ≤ f < 150 kHz | -36 dBm | 1 kHz |  |
| 150 kHz ≤ f < 30 MHz | -36 dBm | 10 kHz |  |
| 30 MHz ≤ f < 1000 MHz | -36 dBm | 100 kHz |  |
| 1 GHz ≤ f < 12.75 GHz | -30 dBm | 1 MHz |  |
| -25 dBm | 1 MHz | 3 |
| 12.75 GHz ≤ f < 5th harmonic of the upper frequency edge of the UL operating band in GHz | -30 dBm | 1 MHz | 1 |
| 12.75 GHz < f < 26 GHz | -30 dBm | 1 MHz | 2 |
| NOTE 1: Applies for Band that the upper frequency edge of the UL Band more than 2.69 GHz  NOTE 2: Applies for Band that the upper frequency edge of the UL Band more than 5.2 GHz  NOTE 3: Applies for Band n41, CA configurations including Band n41, and EN-DC configurations that include n41 specified in clause 5.2B of TS 38.101-3 [3] when NS\_04 is signalled. | | | |

*----------------------------- End of modified section ------------------------------*