**3GPP TSG-RAN4 Meeting #115 *R4-2505401***

**Malta, Malta, 19th May 2025 - 23rd May 2025**

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
|  |
|  | **38.101-2** | **CR** | **0793** | **rev** | **-** | **Current version:** | **16.21.0** |  |
|  |
| *For* ***[HE](http://www.3gpp.org/3G_Specs/CRs.htm%22%20%5Cl%20%22_blank)******[LP](http://www.3gpp.org/3G_Specs/CRs.htm%22%20%5Cl%20%22_blank)*** *on using this form: comprehensive instructions can be found at <http://www.3gpp.org/Change-Requests>.* |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network |  |

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|  |
| ***Title:***  | CR on UE RF requirements for EESS protection (Rel-16) |
|  |  |
| ***Source to WG:*** | China Unicom |
| ***Source to TSG:*** | R4 |
|  |  |
| ***Work item code:*** | NR\_mmWave\_protect |  | ***Date:*** | 2025-05-06 |
|  |  |  |  |  |
| ***Category:*** | **A** |  | ***Release:*** | Rel-16 |
|  | *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 canbe 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-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19) Rel-20 (Release 20)* |
|  |  |
| ***Reason for change:*** | In RAN4#114, the CR R4-2501408 was agreed to capture the UE RF requirements for Rel-19 EESS. In RAN4#114bis, the draftCR R4-2505131 for Rel-15 was endorsed.For NS\_202, there is no additional spurious emission requirement of +1dBm/200MHz, and it is impossible the corresponding bit of modifiedMPR-Behavior for n257 and n258 is set to 0. In the Annex H Modified MPR behavior, the A-MPR requirements corresponding to NS\_202 are in the current spec version. No need to mention the referred version. |
|  |  |
| ***Summary of change:*** | Update the requirements of A-MPR and additional spurious emission for NS\_202 refreshed in Rel-19.Add NS\_205 into Table 6.2.3.1-1 and CA\_NS\_205 into Table 6.2A.3.1-1.Add bits for A-MPR requirements for NS\_205 and updated NS\_202 in Table H.1-1 |
|  |  |
| ***Consequences if not approved:*** | The A-MPR requirements corresponding to NS\_205 and updated NS\_202 cannot be mandatorily supported in Rel-15. |
|  |  |
| ***Clauses affected:*** | 3.2, 6.2.3, 6.2A.3, 6.5.3, Annex H |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** | **X** |  |  Test specifications | TS 38.521-2 |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

*< start of changes >*

## 3.2 Symbols

For the purposes of the present document, the following symbols apply:

∆EIRPBC The beam correspondence tolerance, where ∆EIRPBC = EIRP2 – EIRP1

ΔFGlobal Granularity of the global frequency raster

ΔFRaster Band dependent channel raster granularity

ΔfOOB Δ Frequency of Out Of Band emission

ΔRB The starting frequency offset between the allocated RB and the measured non-allocated RB

ΔRIB Allowed reference sensitivity relaxation due to support for inter-band CA operation

ΔRIBC Allowed reference sensitivity relaxation due to support for intra-band contiguous CA operation

ΔRIBNC Allowed reference sensitivity relaxation due to support for intra-band non-contiguous CA operation

ΔMBP,n Allowed relaxation to minimum peak EIRP and reference sensitivity due to support for multi-band operation, per supported band in a combination.

ΔMBS,n Allowed relaxation to EIRP spherical coverage and EIS spherical coverage due to support for multi-band operation, per supported band in a combination

∑MBP Total allowed relaxation to minimum peak EIRP and reference sensitivity due to support for multi-band operation, for all supported bands in a combination

∑MBS Total allowed relaxation to each, EIRP spherical coverage and EIS spherical coverage due to support for multi-band operation, for all supported bands in a combination

BWChannel Channel bandwidth

BWChannel\_CA Aggregated channel bandwidth, expressed in MHz

BWGB max( BWGB,Channel(k) )

BWGB,Channel(k) Minimum guard band defined in clause 5.3A.2 of carrier k

BWinterferer Bandwidth of the interferer

BWintraCA Aggregated channel bandwidth for intraband CA with or without contiguous RBs allocation, expressed in MHz. BWintraCA = BWChannel\_CA in case of contiguous RBs allocation. BWintraCA is the frequency separation between the lower edge of the lowest allocated RB and the higher edge of the highest allocated RB in case of non-contiguous RBs allocation.

Ceil(x) Rounding upwards; ceil(x) is the smallest integer such that ceil(x) ≥ x

EIRP1 The measured total EIRP based on the beam the UE chooses autonomously (corresponding beam) to transmit in the direction of the incoming DL signal, which is based on beam correspondence without relying on UL beam sweeping

EIRP2 The measured total EIRP based on the beam yielding highest EIRP in a given direction, which is based on beam correspondence with relying on UL beam sweeping

EIRPmax The applicable maximum EIRP as specified in clause 6.2.1

Floor(x) Rounding downwards; floor(x) is the greatest integer such that floor(x) ≤ x

F\_center The center frequency of an allocated block of PRBs

FC Center frequency of a carrier for a numerology defined by the *RF reference frequency* on the channel raster mapped to the carrier according to sub-clause 5.4.2.2

FC,block, high Fc of the highest transmitted/received carrier in a sub-block.

FC,block, low Fc of the lowest transmitted/received carrier in a sub-block.

FC, low The Fc of the lowest carrier, expressed in MHz.

FC, high The Fc of the highest carrier, expressed in MHz.

FDL\_low The lowest frequency of the downlink *operating band*

FDL\_high The highest frequency of the downlink *operating band*

Fedge,block,low The lower sub-block edge, where Fedge,block,low = FC,block,low - Foffset, low.

Fedge,block,high The upper sub-block edge, where Fedge,block,high = FC,block,high + Foffset, high.

Fedge, low The lower edge of *Aggregated Channel Bandwidth*, expressed in MHz. Fedge, low = FC, low - Foffset, low.

Fedge, high The upper edge of *Aggregated Channel Bandwidth*, expressed in MHz. Fedge, high = FC, high + Foffset, high.

FInterferer Frequency of the interferer

FInterferer (offset) Frequency offset of the interferer (between the center frequency of the interferer and the carrier frequency of the carrier measured)

FIoffset Frequency offset of the interferer (between the center frequency of the interferer and the closest edge of the carrier measured)

Floor(x) Rounding downwards; floor(x) is the greatest integer such that floor(x) ≤ x

Foffset, low Frequency offset from FC, low to the lower *UE RF Bandwidth edge*, or from FC,block, low to the lower sub-block edge

Foffset, high Frequency offset from FC, high to the upper *UE RF Bandwidth edge*, or from FC,block, high to the upper sub-block edge

FOOB The boundary between the NR out of band emission and spurious emission domains

FREF RF reference frequency

FREF-Offs Offset used for calculating FREF

FUL\_low The lowest frequency of the uplink *operating band*

FUL\_high The highest frequency of the uplink *operating band*

FUL\_Meas The sub-carrier frequency for which the equalizer coefficient is evaluated

GBChannel Minimum guard band defined in clause 5.3.3, expressed in kHz

LCRB Transmission bandwidth which represents the length of a contiguous resource block allocation expressed in units of resources blocks

LCRB,Max Maximum number of RB for a given Channel bandwidth and sub-carrier spacing

Max() The largest of given numbers

Min() The smallest of given numbers

MPRf,c Maximum output power reduction for carrier *f* of serving cell *c*

MPRnarrow Maximum output power reduction due to narrow PRB allocation

MPRWT Maximum power reduction due to modulation orders, transmit bandwidth configurations, waveform types

*n*PRB Physical resource block number

NRACLR NR ACLR

NRB Transmission bandwidth configuration, expressed in units of resource blocks

NRB,low Transmission bandwidth configurations according to Table 5.3.2-1 for the lowest assigned component carrier in clause 5.3A.1

NRB,high Transmission bandwidth configurations according to Table 5.3.2-1 for the highest assigned component carrier in clause 5.3A.1

NREF NR Absolute Radio Frequency Channel Number (NR-ARFCN)

NREF-Offs Offset used for calculating NREF

PCMAX The configured maximum UE output power

PCMAX, *f*, *c* The configured maximum UE output power for carrier *f* of serving cell *c*

Pint The intermediate power point as defined in table 6.3.4.2-2

PInterferer Modulated mean power of the interferer

Pmax The maximum UE output power as specified in clause 6.2.1

Pmin The minimum UE output power as specified in clause 6.3.1

P-MPRf,c The Power Management UE Maximum Power Reduction for carrier *f* of serving cell *c*

PPowerClass Nominal UE power class (i.e., no tolerance) as specified in clause 6.2.1

PRB The transmitted power per allocated RB, measured in dBm

PTMAX,f,c The measured total radiated power for carrier *f* of serving cell *c*

PUMAX The measured configured maximum UE output power

Pw Power of a wanted DL signal

RBstart Indicates the lowest RB index of transmitted resource blocks

SCSlow SCS for the lowest assigned component carrier in clause 5.3A.1, expressed in kHz

SCShigh SCS for the highest assigned component carrier in clause 5.3A.1, expressed in kHz

SSREF SS block reference frequency position

T(∆P) The tolerance T(∆P) for applicable values of ∆P (values in dB)

TRPmax The maximum TRP for the UE power class as specified in clause 6.2.1

*< Next changes >*

### 6.2.3 UE maximum output power with additional requirements

#### 6.2.3.1 General

Additional emission requirements can be signalled by the network. Each additional emission requirement is associated with a unique network signalling (NS) value indicated in RRC signalling by an NR frequency band number of the applicable operating band and an associated value in the field *additionalSpectrumEmission*. Throughout this specification, the notion of indication or signalling of an NS value refers to the corresponding indication of an NR frequency band number of the applicable operating band (the IE field *freqBandIndicatorNR*) and an associated value of *additionalSpectrumEmission* in the relevant RRC information elements.

To meet these additional requirements, additional maximum power reduction (A-MPR) is allowed for the maximum output power as specified in clause 6.2.1. Unless stated otherwise, an A-MPR of 0 dB shall be used.

Table 6.2.3.1-1 specifies the additional requirements with their associated network signalling values and the allowed A-MPR and applicable operating band(s) for each NS value. The mapping of NR frequency band numbers and values of the *additionalSpectrumEmission* to network signalling labels is specified in Table 6.2.3.1-2. Unless otherwise stated, the allowed total back off is maximum of A-MPR and MPR specified in clause 6.2.2.

Table 6.2.3.1-1: Additional maximum power reduction (A-MPR)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Network Signalling label | Requirements (clause) | NR Band | Channel bandwidth (MHz) | Resources Blocks (*N*RB) | A-MPR (dB) |
| NS\_200 |  |  |  |  | N/A |
| NS\_201(NOTE 1) | 6.5.3.2.2 | n258 |  |  | 6.2.3.2 |
| NS\_202 | 6.5.3.2.3 | n257, n258 | 50, 100, 200, 400 | Table 5.3.2-1 | 6.2.3.3 |
| NS\_203 | 6.5.3.2.4 | n258 | 50, 100, 200, 400 | Table 5.3.2-1 | 6.2.3.4 |
| NS\_205 | (NOTE2) | n257, n258 | 50, 100, 200, 400 | Table 5.3.2-1 | (NOTE 3) |
| NOTE 1: NS\_201 is obsolete, the associated additional spurious emission requirements are not applicable.NOTE 2: Specified in clause 6.5.3.2.6 of latest Rel-19 version of TS 38.101-2.NOTE 3: Specified in clause 6.2.3.6 of latest Rel-19 version of TS 38.101-2 |

Table 6.2.3.1-2: Mapping of Network Signalling label

|  |  |
| --- | --- |
| NR Band | Value of *additionalSpectrumEmission*(NOTE 1) |
|  | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| n257 | NS\_200 | NS\_202 | NS\_205 |  |  |  |  |  |
| n258 | NS\_200 | NS\_201(NOTE 2) | NS\_202 | NS\_203 | NS\_205 |  |  |  |
| n259 | NS\_200 |  |  |  |  |  |  |  |
| n260 | NS\_200 |  |  |  |  |  |  |  |
| n261 | NS\_200 |  |  |  |  |  |  |  |
| NOTE 1: *additionalSpectrumEmission* corresponds to an information element of the same name defined in sub-clause 6.3.2 of TS 38.331 [13]. NOTE 2: NS\_201 is obsolete, the associated additional spurious emission requirements are not applicable. |

*< Next changes >*

#### 6.2.3.3 A-MPR for NS\_202

##### 6.2.3.3.1 A-MPR for NS\_202 for power class 1

For power class 1, A-MPR for NS\_202 shall be 11.0 dB.

##### 6.2.3.3.2 A-MPR for NS\_202 for power class 2

For power class 2, A-MPR for NS\_202 specified in clause 6.2.3.3.3 applies.

##### 6.2.3.3.3 A-MPR for NS\_202 for power class 3

For power class 3, A-MPR for NS\_202 shall be 2.0 dB.

##### 6.2.3.3.4 A-MPR for NS\_202 for power class 4

For power class 4, A-MPR for NS\_202 specified in clause 6.2.3.3.3 applies.

#### 6.2.3.4 A-MPR for NS\_203

##### 6.2.3.4.1 A-MPR for NS\_203 for power class 1

For power class 1, A-MPR for NS\_203 shall be 3.0 dB if Offset frequency < BWchannel, 0.0 dB otherwise.
The Offset frequency is defined as the frequency from 24.25 GHz to the lower edge of the channel bandwidth.

##### 6.2.3.4.2 A-MPR for NS\_203 for power class 2

For power class 2, A-MPR for NS\_203 specified in subclause 6.2.3.4.3 applies.

##### 6.2.3.4.3 A-MPR for NS\_203 for power class 3

For power class 3, A-MPR for NS\_203 shall be 0 dB.

##### 6.2.3.4.4 A-MPR for NS\_203 for power class 4

For power class 4, A-MPR for NS\_203 specified in subclause 6.2.3.4.3 applies.

*< Next changes >*

### 6.2A.3 UE maximum output power with additional requirements for CA

#### 6.2A.3.1 General

Additional emission requirements can be signalled by the network with network signalling value indicated by the field *additionalSpectrumEmission.* To meet these additional requirements, additional maximum power reduction (A-MPR) is allowed for the maximum output power as specified in clause 6.2A.1. Unless stated otherwise, an A-MPR of 0 dB shall be used. Unless otherwise stated, the allowed total back off is maximum of A-MPR and MPR specified in clause 6.2A.2.

For intra-band contiguous aggregation with the UE configured for transmissions on two serving cells, the maximum output power reduction specified in Table 6.2A.3.1-1 is allowed for all serving cells of the applicable uplink contiguous CA configurations.

Table 6.2A.3.1-1 specifies the additional requirements and allowed A-MPR with corresponding network signalling label and operating band. The mapping between network signalling labels and the *additionalSpectrumEmission* IE defined in TS 38.331 [13] is specified in Table 6.2A.3.1-2. Unless otherwise stated, the allowed total back off is maximum of A-MPR and MPR specified in clause 6.2A.2.

Table 6.2A.3.1-1: Additional maximum power reduction (A-MPR)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Network Signalling value | Requirements (clause) | NR Band | Channel bandwidth (MHz) | Resources Blocks (*N*RB) | A-MPR (dB) |
| CA\_NS\_200 |  |  |  |  | N/A |
| CA\_NS\_201(NOTE 1) | 6.5A.3.2.2 | n258 |  |  | 6.2A.3.2 |
| CA\_NS\_202 | 6.5A.3.2.3 | n257, n258 |  |  | 6.2A.3.3 |
| CA\_NS\_203 | 6.5A.3.2.4 | n258 |  |  | 6.2A.3.4 |
| CA\_NS\_205 | (NOTE 2) | n257, n258 |  |  | (NOTE 3) |
| NOTE1: CA\_NS\_201 is obsolete, the associated additional spurious emission requirementare not applicable.NOTE 2: Specified in clause 6.5A.3.2.6 of latest Rel-19 version of TS 38.101-2.NOTE 3: Specified in clause 6.2A.3.6 of latest Rel-19 version of TS 38.101-2. |

Table 6.2A.3.1-2: Value of additionalSpectrumEmission

|  |  |
| --- | --- |
| NR Band | Value of additionalSpectrumEmission / NS number |
|  | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| n257 | CA\_NS\_200 | CA\_NS\_202 | CA\_NS\_205 |  |  |  |  |  |
| n258 | CA\_NS\_200 | CA\_NS\_201 | CA\_NS\_202 | CA\_NS\_203 | CA\_NS\_205 |  |  |  |
| n259 | CA\_NS\_200 |  |  |  |  |  |  |  |
| n260 | CA\_NS\_200 |  |  |  |  |  |  |  |
| n261 | CA\_NS\_200 |  |  |  |  |  |  |  |
| NOTE 1: additionalSpectrumEmission corresponds to an information element of the same name defined in clause 6.3.2 of TS 38.331 [13].NOTE 2: CA\_NS\_201 is obsolete, the associated additional spurious emission requirements are not applicable. |

*< Next changes >*

#### 6.2A.3.3 A-MPR for CA\_NS\_202

##### 6.2A.3.3.1 A-MPR for CA\_NS\_202 for power class 1

- For intra-band contiguous UL CA, A-MPR for CA\_NS\_202 shall be 11.0 dB.

- For intra-band contiguous UL CA with non-contiguous RB allocation or non-contiguous UL CA, A-MPR for CA\_NS\_202 shall be 13.0 dB if offset frequency < BWintraCA, 11.0 dB otherwise.

Offset frequency is defined as the frequency from the upper edge of the protected frequency range i.e. 24 GHz to the lower edge of the aggregated channel bandwidth of the configured UL CA.

##### 6.2A.3.3.2 A-MPR for CA\_NS\_202 for power class 2

For UL CA, A-MPR for CA\_NS\_202 specified in sub-clause 6.2A.3.3.3 applies.

##### 6.2A.3.3.3 A-MPR for CA\_NS\_202 for power class 3

- For intra-band contiguous UL CA, A-MPR for CA\_NS\_202 shall be 5.0 dB if offset frequency < BWintraCA, 2.0 dB otherwise.

- For intra-band contiguous UL CA with non-contiguous RB allocation or non-contiguous UL CA, A-MPR for CA\_NS\_202 shall be 8.0 dB if offset frequency < BWintraCA, 2.0 dB otherwise.

Offset frequency is defined as the frequency from the upper edge of the protected frequency range i.e. 24 GHz to the lower edge of the aggregated channel bandwidth of the configured UL CA.

##### 6.2A.3.3.4 A-MPR for CA\_NS\_202 for power class 4

For UL CA, A-MPR for CA\_NS\_202 specified in sub-clause 6.2A.3.3.3 applies.

#### 6.5.3.2 Additional spurious emissions

##### 6.5.3.2.1 General

These requirements are specified in terms of an additional spurious emission requirement. Additional spurious

emission requirements are signalled by the network to indicate that the UE shall meet an additional requirement for

a specific deployment scenario as part of the cell handover/broadcast message.

##### 6.5.3.2.2 Void

Table 6.5.3.2.2-1: (Void)

##### 6.5.3.2.3 Additional spurious emission requirements for NS\_202

When "NS\_202" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.3.2.3-1.

Table 6.5.3.2.3-1: Additional requirements (NS\_202)

|  |  |  |
| --- | --- | --- |
| Frequency Range | Maximum Level | Measurement bandwidth |
| 7.25 GHz ≤ f ≤ 2nd harmonic of the upper frequency edge of the UL operating band  | -10 dBm | 100 MHz |
| 23.6 GHz f 24.0 GHz | -5dBm | 200 MHz |
| NOTE 1: This requirement also applies for the frequency ranges that are less than FOOB (MHz) in Table 6.5.3-1 from the edge of the channel bandwidth. The protection of frequency range 23600 - 24000 MHz is meant for protection of satellite passive services. |

*< Next changes >*

Annex H (Normative):
Modified MPR behavior

# H.1 Indication of modified MPR behavior

This annex contains the definitions of the bits in the field *modifiedMPR-Behavior* indicated per supported NR band in the IE *RF-Parameters* [13] by a UE supporting an MPR or A-MPR modified in a given version of this specification. A modified MPR or A-MPR behaviour can apply to a supported NR band in stand-alone operation (including CA and NN-DC operation) or in non-standalone operation with the said NR band as part of an EN-DC or NE-DC band combination. Moreover, the bits in the field can explicitly indicate NS value(s) supported by a UE.

NOTE 1: In the present release, the *modifiedMPR-Behavior* is indicated [13] by an 8-bit bitmap per supported NR band.

Table H.1-1: Definitions of the bits in the field *modifiedMPRbehavior*

|  |  |  |  |
| --- | --- | --- | --- |
| NR Band | Index of field(bit number) | Definition(description of the supported functionality if indicator set to one) | Notes |
| n257 | 0 (leftmost bit) | - FR2 power class 3 MPR as defined in clause 6.2.2.3 of 38.101-2 v16.2.0 | - This bit may be set to 1 by a UE supporting n257 |
| 1 | - NS\_202 as defined in clause 6.5.3.2.3 or both NS\_202 and CA\_NS\_202 as defined in clause 6.5A.3.2.3 | - This bit shall be set to 1 by a UE supporting n257 or both n257 and CA\_n257 |
| 2 | - NS\_205 as defined in clause 6.5.3.2.6 or both NS\_205 and CA\_NS\_205 as defined in clause 6.5A.3.2.6 in latest version of Rel-19 | - This bit shall be set to 1 by a UE supporting n257 or both n257 and CA\_n257 |
| n258 | 0 (leftmost bit) | - FR2 power class 3 MPR as defined in clause 6.2.2.3 of 38.101-2 v16.2.0 | - This bit may be set to 1 by a UE supporting n258 |
| 1 | Void |  |
| 2 | - NS\_203 as defined in clause 6.5.3.2.4 or both NS\_203 and CA\_NS\_203 as defined in clause 6.5A.3.2.4 of 38.101-2 v15.12.0 | - This bit shall be set to 1 by a UE supporting n258 or both n258 and CA\_n258 |
| 3 | - NS\_202 as defined in clause 6.5.3.2.3 or both NS\_202 and CA\_NS\_202 as defined in clause 6.5A.3.2.3 | - This bit shall be set to 1 by a UE supporting n258 or both n258 and CA\_n258 |
| 4 | - NS\_205 as defined in clause 6.5.3.2.6 or both NS\_205 and CA\_NS\_205 as defined in clause 6.5A.3.2.6 in the latest version of Rel-19 | - This bit shall be set to 1 by a UE supporting n258 or both n258 and CA\_n258 |
| n260 | 0 (leftmost bit) | - FR2 power class 3 MPR as defined in clause 6.2.2.3 of 38.101-2 v16.2.0 | - This bit may be set to 1 by a UE supporting n260 |
| n261 | 0 (leftmost bit) | - FR2 power class 3 MPR as defined in clause 6.2.2.3 of 38.101-2 v16.2.0 | - This bit may be set to 1 by a UE supporting n261 |

*< end of changes >*