**3GPP TSG-RAN WG4 Meeting #99-eR4-2110620**

**E-meeting, 19th May, 2021 – 27th May, 2021**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.141-1** | **CR** | **0230** | **rev** | **1** | **Current version:** | **16.7.0** |  |
|  | | | | | | | | |
| *For* ***[HE](http://www.3gpp.org/3G_Specs/CRs.htm" \l "_blank)******[LP](http://www.3gpp.org/3G_Specs/CRs.htm" \l "_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 |  | Radio Access Network | **X** | Core Network |  |

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|  | | | | | | | | | | |
| ***Title:*** | CR to TS 38.141-1: introduction of NR-U BS | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | ZTE Corporation | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_unlic-Perf | | | | |  | ***Date:*** | | | 2021-05-19 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***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 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-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | NR-U BS conformance testing requirement is provided and therefore the corresponding requirements should be specified.  The draft CR R4-2106002 has already been approved in RAN4#98-bis-e meeting. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Summary the change:  1.Measurement uncertainty and for n46 and n96;  2. Regional requirements;  Tx:  1. Base station output power;  2. Output power dynamics ;  3. UEM/ACLR requirements/spurious emission;  Rx:   1. REFSENS; 2. Dynamic range; 3. ACS/IBB; 4. Receiver spurious emission; 5. Receiver intermodulation 6. ICS 7. Annex A FRC | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | NR-U BS conformance testing requirements is not provided yet. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 3.2, 4.1.2.2, 4.1.2.3, 4.4, 6.2.1, 6.3.3.1, 6.6.3.5.2, 6.6.4.5.5A, 6.6.4.5.6.4, 6.6.5.5.1.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8, Annex A | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | | **X** |  | Test specifications | | | | TS37.141 | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

**<Start of change>**

## 3.2 Symbols

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

 Percentage of the mean transmitted power emitted outside the occupied bandwidth on the assigned channel

BWChannel *BS channel bandwidth*

BWChannel\_CA *Aggregated BS channel bandwidth*, expressed in MHz. BWChannel\_CA= Fedge\_high- Fedge\_low.

BWChannel,block Sub-block bandwidth, expressed in MHz. BWChannel,block = Fedge,block,high- Fedge,block,low.

BWConfig Transmission bandwidth configuration, expressed in MHz, where BWConfig = *N*RB x SCS x 12 kHz

BWtot *Total RF bandwidth*

Δf Separation between the channel edge frequency and the nominal -3 dB point of the measuring filter closest to the carrier frequency

ΔfBE\_offset Separation between the edge of the last transmitted channel of the channels assigned for NR-U channel bandwidth and the nominal -3 dB point of the measuring filter closest to the carrier frequency

Δfmax f\_offsetmax minus half of the bandwidth of the measuring filter

ΔFGlobal Global frequency raster granularity

ΔfOBUE Maximum offset of the *operating band* unwanted emissions mask from the downlink *operating band* edge

ΔfOOB Maximum offset of the out-of-band boundary from the uplink *operating band* edge

ΔFRaster Channel raster granularity

ΔSUL Channel raster offset for SUL

FC *RF reference frequency* on the channel raster

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

Fedge\_low The lower edge of *aggregated BS channel bandwidth*, expressed in MHz. Fedge\_low = FC\_low - Foffset\_low

Fedge\_high The upper edge of *aggregated BS channel bandwidth*, expressed in MHz. Fedge\_high = FC\_high + Foffset\_high.

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

Foffset\_high Frequency offset from FC\_high to the upper *Base Station RF Bandwidth edge*, or from FC,block, high to the upper sub-block edge

Foffset\_low Frequency offset from FC\_low to the lower *Base Station RF Bandwidth edge*, or from FC,block, low to the lower sub-block edge

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

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

f\_offset Separation between the channel edge frequency and the centre of the measuring filter

f\_offsetmax The offset to the frequency ΔfOBUE outside the downlink *operating band*

FREF RF reference frequency

FREF,SUL RF reference frequency for Supplementary Uplink (SUL) bands

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

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

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

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

GBChannel Minimum guard band defined in TS 38.104 [2] clause 5.3.3

Iuant gNB internal logical interface between the implementation specific O&M function and the RET antennas and TMAs control unit function of the gNB

Ncells The declared number corresponding to the minimum number of cells that can be transmitted by an *BS type 1-H* in a particular *operating band*

NRB Transmission bandwidth configuration, expressed in resource blocks

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

NRXU,active The number of active receiver units. The same as the number of *demodulation branches* to which compliance is declared for chapter 8 performance requirements

NRXU,counted The number of active receiver units that are taken into account for conducted Rx spurious emission scaling, as calculated in clause 7.6.1

NRXU,countedpercell The number of active receiver units that are taken into account for conducted RX spurious emissions scaling per cell, as calculated in clause 7.6.1

NTXU,counted The number of *active transmitter units* as calculated in clause 6.1, that are taken into account for conducted TX output power limit in clause 6.2.1, and for unwanted TX emissions scaling

NTXU,countedpercell The number of *active transmitter units* that are taken into account for conducted TX emissions scaling per cell, as calculated in clause 6.1

PEM,n50,ind Declared emission level for Band n50 in the band 1518-1559 MHz; ind = a, b

Pmax,c,AC*Maximum carrier output power* measuredper *antenna connector*

Pmax,c,cell The *maximum carrier output power* per *TAB connector TX min cell group*

Pmax,c,TABC The *maximum carrier output power per TAB connector*

Prated,c,AC The *rated carrier output power per antenna connector*

Prated,c,sys The sum of Prated,c,TABC for all *TAB connectors* for a single carrier

Prated,c,TABC The *rated carrier output power per TAB connector*

Prated,t,AC The *rated total output power* declared at the antenna connector

Prated,t,TABC The *rated total output power* declared at *TAB connector*

PREFSENS Conducted Reference Sensitivity power level

SSREF SS block reference frequency position

Wgap Sub-block gap or Inter RF Bandwidth gap size

**<Next of change>**

#### 4.1.2.2 Measurement of transmitter

Table 4.1.2.2-1: Maximum Test System uncertainty for transmitter tests

| Clause | Maximum Test System Uncertainty | Derivation of Test System Uncertainty |
| --- | --- | --- |
| 6.2 Base Station output power | ±0.7 dB, f ≤ 3 GHz  ±1.0 dB, 3 GHz < f ≤ 6 GHz (Note)  ±1.5 dB, for bands n46 and n96 |  |
| 6.3 Output power dynamics | ± 0.4 dB |  |
| 6.4.1 Transmit OFF power | ±2.0 dB , f ≤ 3 GHz  ±2.5 dB, 3 GHz < f ≤ 6 GHz (Note)  ±3 dB, for bands n46 and n96 |  |
| 6.4.2 Transmitter transient period | N/A |  |
| 6.5.2 Frequency error | ± 12 Hz |  |
| 6.5.3 EVM | ± 1% |  |
| 6.5.4 Time alignment error | ± 25ns |  |
| 6.6.2 Occupied bandwidth | 5 MHz, 10 MHz BS Channel BW: ±100 kHz  15 MHz, 20 MHz, 25 MHz, 30 MHz, 40 MHz, 50 MHz BS Channel BW: ±300 kHz  60 MHz, 70 MHz, 80 MHz, 90 MHz, 100 MHz BS Channel BW: ±600 kHz |  |
| 6.6.3 Adjacent Channel Leakage power Ratio (ACLR) | ACLR/ CACLR  BW ≤ 20MHz: ±0.8 dB  BW > 20MHz: ±1.2 dB  Absolute power ±2.0 dB, f ≤ 3 GHz  Absolute power ±2.5 dB, 3 GHz < f ≤ 6 GHz (Note)  Absolute power ±3 dB, for bands n46 and n96  CACLR  BW ≤ 20MHz: ±0.8 dB  BW > 20MHz: ±1.2 dB  CACLR absolute power ±2.0 dB , f ≤ 3 GHz  CACLR absolute power ±2.5 dB, 3 GHz < f ≤ 6 GHz  CACLR absolute power ±3 dB, for bands n46 and n96  (Note) |  |
| 6.6.4 Operating band unwanted emissions | ±1.5 dB, f ≤ 3 GHz  ±1.8 dB, 3 GHz < f ≤ 6 GHz (Note)  ±2.2 dB, for bands n46 and n96 |  |
| 6.6.5.5.1.1 Transmitter spurious emissions, Mandatory Requirements | 9 kHz < f ≤ 4 GHz: ±2.0 dB  4 GHz < f ≤ 19 GHz: ±4.0 dB  19 GHz < f ≤ 26 GHz: ±4.5 dB |  |
| 6.6.5.5.1.2 Transmitter spurious emissions, Protection of BS receiver | ±3.0 dB |  |
| 6.6.5.5.1.3 Transmitter spurious emissions, Additional spurious emission requirements | ±2.0 dB for > -60 dBm, f ≤ 3 GHz  ±2.5 dB, 3 GHz < f ≤ 4.2 GHz  ±3.0 dB, 4.2 GHz < f ≤ 6 GHz  ±3.0 dB for ≤ -60 dBm, f ≤ 3 GHz  ±3.5 dB, 3 GHz < f ≤ 4.2 GHz  ±4.0 dB, 4.2 GHz < f ≤ 6 GHz  ±4.0 dB, for bands n46 and n96 |  |
| 6.6.5.2.4 Transmitter spurious emissions, Co-location | ±3.0 dB |  |
| 6.7 Transmitter intermodulation  (interferer requirements)  This tolerance applies to the stimulus and not the measurements defined in 6.6.3, 6.6.4 and 6.6.5 | The value below applies only to the interfering signal and is unrelated to the measurement uncertainty of the tests in 6.6.3 (ACLR), 6.6.4 (OBUE) and 6.6.5 (spurious emissions) which have to be carried out in the presence of the interferer.  ±1.0 dB | The uncertainty of interferer has double the effect on the result due to the frequency offset |
| NOTE: Test system uncertainty values for 4.2 GHz < f ≤ 6 GHz apply for BS operates in licensed spectrum only. | | |

**<Next of change>**

#### 4.1.2.3 Measurement of receiver

Table 4.1.2.3-1: Maximum Test System Uncertainty for receiver tests

| Clause | Maximum Test System Uncertainty | Derivation of Test System Uncertainty |
| --- | --- | --- |
| 7.2 Reference sensitivity level | ±0.7 dB, f ≤ 3 GHz  ±1.0 dB, 3 GHz < f ≤ 4.2 GHz  ±1.2 dB, 4.2 GHz < f ≤ 6 GHz  ±1.5 dB, for bands n46 and n96 |  |
| 7.3 Dynamic range | ±0.3 dB |  |
| 7.4.1 Adjacent channel selectivity | ±1.4 dB, f ≤ 3 GHz  ±1.8 dB, 3 GHz < f ≤ 4.2 GHz  ±2.1 dB, 4.2 GHz < f ≤ 6 GHz (Note 2)  ±2.5 dB, for bands n46 and n96 | Overall system uncertainty comprises three quantities:  1. Wanted signal level error  2. Interferer signal level error  3. Additional impact of interferer leakage  Items 1 and 2 are assumed to be uncorrelated so can be root sum squared to provide the ratio error of the two signals. The interferer leakage effect is systematic, and is added arithmetically.  Test System uncertainty = SQRT (wanted\_level\_error2 + interferer\_level\_error2) + leakage effect.  f ≤ 3 GHz  Wanted signal level ±0.7 dB  Interferer signal level ±0.7 dB  3 GHz < f ≤ 4.2 GHz  Wanted signal level ±1.0 dB  Interferer signal level ±1.0 dB  4.2 GHz < f ≤ 6 GHz  Wanted signal level ±1.22 dB  Interferer signal level ±1.22 dB  Bands n46 and n96  Wanted signal level ± 1.5dB  Interferer signal level ± 1.8dB  f ≤ 6 GHz  Impact of interferer leakage 0.4 dB |
| 7.4.2.4.2 In-band blocking (General blocking) | ±1.6 dB, f ≤ 3 GHz  ±2.0 dB, 3 GHz < f ≤ 4.2 GHz  ±2.2 dB, 4.2 GHz < f ≤ 6 GHz (Note 2)  ±2.7 dB, for bands n46 and n96 |  |
| 7.4.2.4.3 In-band blocking  (Narrow band blocking) | ±1.4 dB, f ≤ 3 GHz  ±1.8 dB, 3 GHz < f ≤ 4.2 GHz  ±2.1 dB, 4.2 GHz < f ≤ 6 GHz (Note 2) |  |
| 7.5.5.1 Out-of-band blocking (General requirements) | fwanted ≤ 3GHz  1MHz < finterferer ≤ 3 GHz: ±1.3 dB  3.0GHz < finterferer ≤ 4.2 GHz: ±1.5 dB  4.2GHz < finterferer ≤ 12.75 GHz: ±3.2 dB  3GHz < fwanted ≤ 4.2GHz:  1MHz < finterferer ≤ 3 GHz: ±1.5 dB  3.0GHz < finterferer ≤ 4.2 GHz: ±1.7 dB  4.2GHz < finterferer ≤ 12.75 GHz: ±3.3 dB  4.2GHz < fwanted ≤ 6.0GHz:  1MHz < finterferer ≤ 3 GHz: ±1.7 dB  3.0GHz < finterferer ≤ 4.2 GHz: ±1.8 dB  4.2GHz < finterferer ≤ 12.75 GHz: ±3.3 dB  fwanted: for bands n46 and n96  1MHz < finterferer ≤ 3 GHz: ±1.9 dB  3.0GHz < finterferer ≤ 4.2 GHz: ±2.0 dB  4.2GHz < finterferer ≤ 12.75 GHz: ±3.5 dB | Overall system uncertainty comprises three quantities:  1. Wanted signal level error  2. Interferer signal level error  3. Interferer broadband noise  Items 1 and 2 are assumed to be uncorrelated so can be root sum squared to provide the ratio error of the two signals. The Interferer Broadband noise effect is systematic, and is added arithmetically.  Test System uncertainty = SQRT (wanted\_level\_error2 + interferer\_level\_error2) + Broadband noise effect.  Out of band blocking, using CW interferer:  Wanted signal level:  ±0.7 dB up to 3 GHz  ±1.0 dB up to 4.2 GHz  ±1.22 dB up to 6 GHz  Interferer signal level:  ±1.0 dB up to 3 GHz  ±1.2 dB up to 4.2 GHz  ±3.0 dB up to 12.75 GHz  Impact of interferer Broadband noise 0.1 dB |
| 7.5.5.2 Out-of-band blocking (Co-location requirements) | Co-location blocking, using CW interferer:  ±2.5 dB, f ≤ 3.0 GHz  ±2.6 dB, 3.0 GHz < f ≤ 4.2 GHz  ±2.7 dB, 4.2 GHz < f ≤ 6.0 GHz  ±2.9 dB, for bands n46 and n96 | Co-location blocking, using CW interferer:  f ≤ 3.0 GHz  Wanted signal level ± 0.7 dB  3.0 GHz < f ≤ 4.2 GHz  Wanted signal level ± 1.0dB  4.2 GHz < f ≤ 6.0 GHz  Wanted signal level ± 1.22 dB  For bands n46 and n96  Wanted signal level ± 1.5 dB  f ≤ 6.0 GHz  Interferer signal level:  ± 2.0 dB  Interferer signal level for band n46 and n96:  ± 2.0 dB  Interferer ACLR not applicable  Impact of interferer Broadband noise 0.4 dB |
| 7.6 Receiver spurious emissions | 30 MHz ≤ f ≤ 4 GHz: ±2.0 dB  4 GHz < f ≤ 19 GHz: ±4.0 dB  19 GHz < f ≤ 26 GHz: ±4.5 dB |  |
| 7.7 Receiver intermodulation | ±1.8 dB, f ≤ 3.0 GHz  ±2.4 dB, 3.0 GHz < f ≤ 4.2 GHz  ±3.0 dB, 4.2 GHz < f ≤ 6.0 GHz (Note 2)  ±3.3 dB, for bands n46 and n96 | Overall system uncertainty comprises four quantities:  1. Wanted signal level error  2. CW Interferer level error  3. Modulated Interferer level error  4. Impact of interferer ACLR  The effect of the closer CW signal has twice the effect.  Items 1, 2 and 3 are assumed to be uncorrelated so can be root sum squared to provide the combined effect of the three signals. The interferer ACLR effect is systematic, and is added arithmetically.  Test System uncertainty = SQRT [(2 x CW\_level\_error)2 +(mod interferer\_level\_error)2 +(wanted signal\_level\_error)2] + ACLR effect.  f ≤ 3.0 GHz  Wanted signal level ± 0.7dB  CW interferer level ± 0.5 dB  Mod interferer level ± 0.7 dB  3.0 GHz < f ≤ 4.2 GHz  Wanted signal level ± 1.0 dB  CW Interferer level ± 0.7 dB  Mod Interferer level ± 1.0 dB  4.2 GHz < f ≤ 6 GHz  Wanted signal level ± 1.22 dB  CW Interferer level ± 0.98 dB  Mod Interferer level ± 1.22 dB  For bands n46 and n96  Wanted signal level ± 1.5dB  CW Interferer level ± 1.0dB  Mod Interferer level ± 1.5dB  f ≤ 6 GHz  Impact of interferer ACLR 0.4 dB |
| 7.8 In-channel selectivity | ±1.4 dB, f ≤ 3 GHz  ±1.8 dB, 3 GHz < f ≤ 4.2 GHz  ±2.1 dB, 4.2 GHz < f ≤ 6 GHz (Note 2)  ±2.5 dB, for bands n46 and n96 |  |
| NOTE 1: Unless otherwise noted, only the Test System stimulus error is considered here. The effect of errors in the throughput measurements due to finite test duration is not considered.  NOTE 2: Test system uncertainty values for 4.2 GHz < f ≤ 6 GHz apply for BS operates in licensed spectrum only. | | |

**<Next of change>**

## 4.4 Regional requirements

Some requirements in the present document may only apply in certain regions either as optional requirements, or as mandatory requirements set by local and regional regulation. It is normally not stated in the 3GPP specifications under what exact circumstances the regional requirements apply, since this is defined by local or regional regulation.

Table 4.4-1 lists all requirements in the present specification that may be applied differently in different regions.

Table 4.4-1: List of regional requirements

| Clause number | Requirement | Comments |
| --- | --- | --- |
| 5 | Operating bands | Some NR operating bands may be applied regionally. |
| 6.2.1 | Base station output power | Additional output power limits may be applied regionally. |
| 6.6.2 | Occupied bandwidth | The requirement may be applied regionally. There may also be regional requirements to declare the occupied bandwidth according to the definition in present specification. |
| 6.6.3.5.3 | Adjacent Channel Leakage Power Ratio | For Band n41 and n90 operation in Japan, absolute ACLR limits shall be applied to the sum of the absolute ACLR power over all *antenna connectors* for *BS type 1-C*. |
| 6.6.4.5 | Operating band unwanted emission | Category A or Category B operating band unwanted emission limits may be applied regionally.  For operation with shared spectrum channel access, the BS may have to comply with the applicable BS power limits established regionally, when deployed in regions where those limits apply and under the conditions declared by the manufacturer. |
| 6.6.4.5.6.1 | Operating band unwanted emissions:  Limits in FCC Title 47 | The BS may have to comply with the additional requirements, when deployed in regions where those limits are applied, and under the conditions declared by the manufacturer. |
| 6.6.4.5.6.2 | Operating band unwanted emission  Protection of DTT | The BS operating in Band n20 may have to comply with the additional requirements for protection of DTT, when deployed in certain regions. |
| 6.6.4.5.7 | Operating band unwanted emission, | For Band n41 and n90 operation in Japan, the operating band unwanted emissions limits shall be applied to the sum of the emission power over all *antenna connectors* for *BS type 1-C*. |
| 6.6.5.5.1.1 | Transmitter spurious emissions | Category A or Category B spurious emission limits, as defined in ITU-R Recommendation SM.329 [5], may apply regionally.  The emission limits for BS type 1-H specified as the *basic limit* + X (dB) are applicable, unless stated differently in regional regulation.  In addition, for operation with shared spectrum channel access, the BS may have to comply with the applicable spurious emission limits established regionally, when deployed in regions where those limits apply and under the conditions declared by the manufacturer. |
| 6.6.5.5.1.3 | Transmitter spurious emissions: additional requirements | These requirements may be applied for the protection of system operating in frequency ranges other than the BS operating band. |
| 6.6.5.5.3 | Transmitter spurious emissions | For Band n41 and n90 operation in Japan, the sum of the spurious emissions over all *antenna connectors* for *BS type 1-C* shall not exceed the *basic limits*. |
| 6.7.5.1.1,  6.7.5.2.1 | Transmitter intermodulation | Interfering signal positions that are partially or completely outside of any downlink *operating band* of the base station are not excluded from the requirement in Japan in Band n77, n78, n79. |
| 6.7.5.1.2,  6.7.5.2.3 | Transmitter intermodulation | The BS may have to comply with the additional requirements, when deployed in certain regions. |
| 7.6.5.2,  7.6.5.3 | Receiver spurious emissions | The emission limits for BS type 1-H specified as the *basic limit* + X (dB) are applicable, unless stated differently in regional regulation.  For Band n41 and n90 operation in Japan, the sum of RX spurious emissions over all *antenna connectors* for *BS type 1-C* shall not exceed *basic limits* |

**<Next of change>**

## 6.2 Base station output power

### 6.2.1 Definition and applicability

The conducted BS output power requirements are specified at *single-band connector*, or at *multi-band connector*.

The *rated carrier output power* of the *BS type 1-C* shall be as specified in table 6.2.1-1.

Table 6.2.1-1: *Rated carrier output power* limits for *BS type 1-C*

|  |  |
| --- | --- |
| BS class | Prated,c,AC |
| Wide Area BS | (Note) |
| Medium Range BS | ≤ 38 dBm |
| Local Area BS | ≤ 24 dBm |
| NOTE: There is no upper limit for the Prated,c,AC rated output power of the Wide Area Base Station. | |

The *rated carrier output power* of the *BS type 1-H* shall be as specified in table 6.2.1-2.

Table 6.2.1-2: *Rated carrier output power* limits for *BS type 1-H*

| BS class | Prated,c,sys | Prated,c,TABC |
| --- | --- | --- |
| Wide Area BS | (Note) | (Note) |
| Medium Range BS | ≤ 38 dBm +10log(NTXU,counted) | ≤ 38 dBm |
| Local Area BS | ≤ 24 dBm +10log(NTXU,counted) | ≤ 24 dBm |
| NOTE: There is no upper limit for the Prated,c,sys or Prated,c,TABC of the Wide Area Base Station. | | |

In addition, for operation with shared spectrum channel access operation, the BS may have to comply with the applicable BS power limits established regionally, when deployed in regions where those limits apply and under the conditions declared by the manufacturer.

For Band n41 and n90 operation in Japan, the rated output power, Prated,c.sys for BS type 1-H or the sum of Prated,c,AC over all *antenna connectors* for BS type 1-C declared by the manufacturer shall be equal to or less than 20 W per 10 MHz bandwidth.

The output power limit for the respective BS classes in tables 6.2.1.-1 and 6.2.1-2 shall be compared to the rated output power and the declared BS class. It is not subject to testing.

**<Next of change>**

### 6.3.3 Total power dynamic range

#### 6.3.3.1 Definition and applicability

The BS total power dynamic range is the difference between the maximum and the minimum transmit power of an OFDM symbol for a specified reference condition.

NOTE 1: The upper limit of the total power dynamic range is the OFDM symbol TX power (OSTP) for a BS at maximum output power when transmitting on all RBs. The lower limit of the total power dynamic range is the average power for single RB transmission. The OFDM symbols shall carry PDSCH and not contain PDCCH, RS, or SSB.

NOTE 2: The requirement does not apply to operation with shared spectrum channel access.

**<Next of change>**

## 6.6 Unwanted emissions

### 6.6.1 General

Unwanted emissions consist of out-of-band emissions and spurious emissions according to ITU definitions in recommendation ITU-R SM.329 [5]. In ITU terminology, out of band emissions are unwanted emissions immediately outside the channel bandwidth resulting from the modulation process and non-linearity in the transmitter but excluding spurious emissions. Spurious emissions are emissions which are caused by unwanted transmitter effects such as harmonics emission, parasitic emission, intermodulation products and frequency conversion products, but exclude out of band emissions.

The out-of-band emissions requirement for the BS transmitter is specified both in terms of Adjacent Channel Leakage power Ratio (ACLR) and operating band unwanted emissions (OBUE).

The maximum offset of the operating band unwanted emissions mask from the operating band edge is ΔfOBUE. The operating band unwanted emissions define all unwanted emissions in each supported downlink *operating band* plus the frequency ranges ΔfOBUE above and ΔfOBUE below each band. Unwanted emissions outside of this frequency range are limited by a spurious emissions requirement.

The values of ΔfOBUE are defined in table 6.6.1-1 for the NR *operating bands*.

Table 6.6.1-1: Maximum offset of OBUE outside the downlink *operating band*

|  |  |  |
| --- | --- | --- |
| BS type | Operating band characteristics | ΔfOBUE (MHz) |
| *BS type 1-C* | FDL\_high – FDL\_low ≤ 200 MHz | 10 |
|  | 200 MHz < FDL\_high – FDL\_low ≤ 900 MHz | 40 |
| *BS type 1-H* | FDL\_high – FDL\_low < 100 MHz | 10 |
|  | 100 MHz ≤ FDL\_high – FDL\_low ≤ 900 MHz | 40 |

For band n46 and n96, the values of ΔfOBUE are defined in table 6.6.1-1a.

Table 6.6.1-1a: Maximum offset of OBUE outside the downlink *operating band*

|  |  |
| --- | --- |
| ***Operating band*** | **ΔfOBUE (MHz)** |
| n46 | 40 |
| n96 | 50 |

For *BS type 1-H* the unwanted emission requirements are applied per the *TAB connector TX min cell groups* for all the configurations supported by the BS. The *basic limits* and corresponding emissions scaling are defined in each relevant clause.

There is in addition a requirement for occupied bandwidth.

**<Next of change>**

##### 6.6.3.5.2 Limits and *basic limits*

The ACLR is defined with a square filter of bandwidth equal to the transmission bandwidth configuration of the transmitted signal (BWConfig) centred on the assigned channel frequency and a filter centred on the adjacent channel frequency according to the tables below.

For operation in paired and unpaired spectrum, the ACLR shall be higher than the value specified in table 6.6.3.5.2‑1.

Table 6.6.3.5.2-1: Base station ACLR limit

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *BS channel bandwidth* of lowest/highest NR carrier transmitted BWChannel (MHz) | BS adjacent channel centre frequency offset below the lowest or above the highest carrier centre frequency transmitted | Assumed adjacent channel carrier (informative) | Filter on the adjacent channel frequency and corresponding filter bandwidth | ACLR limit |
| 5, 10, 15, 20 | BWChannel | NR of same BW (Note 2) | Square (BWConfig) | 44.2 dB |
|  | 2 x BWChannel | NR of same BW (Note 2) | Square (BWConfig) | 44.2 dB |
|  | BWChannel /2 + 2.5 MHz | 5 MHz E-UTRA | Square (4.5 MHz) | 44.2 dB (NOTE 3) |
|  | BWChannel /2 + 7.5 MHz | 5 MHz E-UTRA | Square (4.5 MHz) | 44.2 dB (NOTE 3) |
| 25, 30, 40, 50, 60, 70, 80, 90, 100 | BWChannel | NR of same BW (Note 2) | Square (BWConfig) | 43.8 dB |
|  | 2 x BWChannel | NR of same BW (Note 2) | Square (BWConfig) | 43.8 dB |
|  | BWChannel /2 + 2.5 MHz | 5 MHz E-UTRA | Square (4.5 MHz) | 43.8 dB (NOTE 3) |
|  | BWChannel /2 + 7.5 MHz | 5 MHz E-UTRA | Square (4.5 MHz) | 43.8 dB (NOTE 3) |
| NOTE 1: BWChannel and BWConfig are the *BS channel bandwidth* and transmission bandwidth configuration of the lowest/highest NR carrier transmitted on the assigned channel frequency.  NOTE 2: With SCS that provides largest transmission bandwidth configuration (BWConfig).  NOTE 3: The requirements are applicable when the band is also defined for E-UTRA or UTRA. | | | | |

For band n46 and n96, the ACLR shall be higher than the value specified in Table 6.6.3.5.2-1a.

**Table 6.6.3.5.2-1a: Base station ACLR limit for band n46 and n96**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***BS channel bandwidth* of lowest/highest NR carrier transmitted BWChannel (MHz)** | **BS adjacent channel centre frequency offset below the lowest or above the highest carrier centre frequency transmitted** | **Assumed adjacent channel carrier (informative)** | **Filter on the adjacent channel frequency and corresponding filter bandwidth** | **ACLR limit** |
| 10, 20, 40, 60, 80 | BWChannel | NR of same BW (Note 2) | Square (BWConfig) | 35 dB |
| 2 x BWChannel | NR of same BW (Note 2) | Square (BWConfig) | 40 dB |
| NOTE 1: BWChannel and BWConfig are the *BS channel bandwidth* and transmission bandwidth configuration of the lowest/highest NR carrier transmitted on the assigned channel frequency.  NOTE 2: With SCS that provides largest transmission bandwidth configuration (BWConfig). | | | | |

The ACLR absolute *basic limit* is specified in table 6.6.3.5.2‑2.

Table 6.6.3.5.2-2: Base station ACLR absolute *basic limit*

|  |  |
| --- | --- |
| BS category / BS class | ACLR absolute *basic limit* |
| Category A Wide Area BS | -13 dBm/MHz |
| Category B Wide Area BS | -15 dBm/MHz |
| Medium Range BS | -25 dBm/MHz |
| Local Area BS | -32 dBm/MHz |

For operation in non-contiguous spectrum or multiple bands, the ACLR shall be higher than the value specified in table 6.6.3.5.2-3.

Table 6.6.3.5.2-3: Base Station ACLR limit in non-contiguous spectrum or multiple bands

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *BS channel bandwidth* of lowest/highest NR carrier transmitted BWChannel (MHz) | Sub-block or Inter RF Bandwidth gap size (Wgap) where the limit applies (MHz) | BS adjacent channel centre frequency offset below or above the sub-block or Base Station RF Bandwidth edge (inside the gap) | Assumed adjacent channel carrier | Filter on the adjacent channel frequency and corresponding filter bandwidth | ACLR limit |
| 5, 10, 15, 20 | Wgap ≥ 15 (Note 3)  Wgap ≥ 45 (Note 4) | 2.5 MHz | 5 MHz NR  (Note 2) | Square (BWConfig) | 44.2 dB |
|  | Wgap ≥ 20 (Note 3)  Wgap ≥ 50 (Note 4) | 7.5 MHz | 5 MHz NR  (Note 2) |  |  |
| 25, 30, 40, 50, 60, 70, 80, 90, 100 | Wgap ≥ 60 (Note 4)  Wgap ≥ 30 (Note 3) | 10 MHz | 20 MHz NR (Note 2) | Square (BWConfig) | 43.8 dB |
|  | Wgap ≥ 80 (Note 4)  Wgap ≥ 50 (Note 3) | 30 MHz | 20 MHz NR (Note 2) |  |  |
| NOTE 1: BWConfig is the transmission bandwidth configuration of the assumed adjacent channel carrier.  NOTE 2: With SCS that provides largest transmission bandwidth configuration (BWConfig).  NOTE 3: Applicable in case the *BS channel bandwidth* of the NR carrier transmitted at the other edge of the gap is 5, 10, 15, 20 MHz.  NOTE 4: Applicable in case the *BS channel bandwidth* of the NR carrier transmitted at the other edge of the gap is 25, 30, 40, 50, 60, 70, 80, 90, 100 MHz. | | | | | |

For operation in non-contiguous spectrum for band n46 and n96, the ACLR shall be higher than the value specified in Table 6.6.3.2-3a.

**Table 6.6.3.5.2-3a: Base Station ACLR limit in non-contiguous spectrum for band n46 and n96**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***BS channel bandwidth* of lowest/highest NR carrier transmitted BWChannel (MHz)** | **Sub-block or Inter RF Bandwidth gap size (Wgap) where the limit applies (MHz)** | **BS adjacent channel centre frequency offset below or above the sub-block or Base Station RF Bandwidth edge (inside the gap)** | **Assumed adjacent channel carrier** | **Filter on the adjacent channel frequency and corresponding filter bandwidth** | **ACLR limit** |
| 10, 20, 40, 60, 80 | Wgap ≥ 60 | 10 MHz | 20 MHz NR (Note 2) | Square (BWConfig) | 35 dB |
| Wgap ≥ 80 | 30 MHz | 20 MHz NR (Note 2) | Square (BWConfig) | 40 dB |
| NOTE 1: BWConfig is the transmission bandwidth configuration of the assumed adjacent channel carrier.  NOTE 2: With SCS that provides largest transmission bandwidth configuration (BWConfig). | | | | | |

The Cumulative Adjacent Channel Leakage power Ratio (CACLR) in a sub-block gap or the Inter RF Bandwidth gap is the ratio of:

a) the sum of the filtered mean power centred on the assigned channel frequencies for the two carriers adjacent to each side of the sub-block gap or the Inter RF Bandwidth gap, and

b) the filtered mean power centred on a frequency channel adjacent to one of the respective sub-block edges or Base Station RF Bandwidth edges.

The assumed filter for the adjacent channel frequency is defined in table 6.6.3.5.2-4 and the filters on the assigned channels are defined in table 6.6.3.5.2-6.

For operation in non-contiguous spectrum or multiple bands, the CACLR for NR carriers located on either side of the sub-block gap or the Inter RF Bandwidth gap shall be higher than the value specified in table 6.6.3.5.2-4.

Table 6.6.3.5.2-4: Base station CACLR limit

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *BS channel bandwidth* of lowest/highest NR carrier transmitted BWChannel (MHz) | Sub-block or Inter RF Bandwidth gap size (Wgap) where the limit applies (MHz) | BS adjacent channel centre frequency offset below or above the sub-block or Base Station RF Bandwidth edge (inside the gap) | Assumed adjacent channel carrier | Filter on the adjacent channel frequency and corresponding filter bandwidth | CACLR limit |
| 5, 10, 15, 20 | 5 ≤ Wgap < 15 (Note 3)  5 ≤ Wgap < 45 (Note 4) | 2.5 MHz | 5 MHz NR  (Note 2) | Square (BWConfig) | 44.2 dB |
|  | 10 < Wgap < 20 (Note 3)  10 ≤ Wgap < 50 (Note 4) | 7.5 MHz | 5 MHz NR  (Note 2) |  |  |
| 25, 30, 40, 50, 60, 70, 80, 90, 100 | 20 ≤ Wgap < 60 (Note 4)  20 ≤ Wgap < 30 (Note 3) | 10 MHz | 20 MHz NR  (Note 2) | Square (BWConfig) | 43.8 dB |
|  | 40 < Wgap < 80 (Note 4)  40 ≤ Wgap < 50 (Note 3) | 30 MHz | 20 MHz NR  (Note 2) |  |  |
| NOTE 1: BWConfig is the transmission bandwidth configuration of the assumed adjacent channel carrier.  NOTE 2: With SCS that provides largest transmission bandwidth configuration (BWConfig).  NOTE 3: Applicable in case the *BS channel bandwidth* of the NR carrier transmitted at the other edge of the gap is 5, 10, 15, 20 MHz.  NOTE 4: Applicable in case the *BS channel bandwidth* of the NR carrier transmitted at the other edge of the gap is 25, 30, 40, 50, 60, 70, 80, 90, 100 MHz. | | | | | |

For operation in non-contiguous spectrum for band n46 and n96, the CACLR for NR carriers located on either side of the sub-block gap shall be higher than the value specified in Table 6.6.3.5.2-4a.

**Table 6.6.3.5.2-4a: Base Station CACLR limit for band n46 and n96**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***BS channel bandwidth* of lowest/highest NR carrier transmitted BWChannel (MHz)** | **Sub-block or Inter RF Bandwidth gap size (Wgap) where the limit applies (MHz)** | **BS adjacent channel centre frequency offset below or above the sub-block or Base Station RF Bandwidth edge (inside the gap)** | **Assumed adjacent channel carrier** | **Filter on the adjacent channel frequency and corresponding filter bandwidth** | **CACLR limit** |
| 10, 20, 40, 60, 80 | 20 ≤Wgap< 60 | 10 MHz | 20 MHz NR (Note 2) | Square (BWConfig) | 35 dB |
| 40 < Wgap< 80 | 30 MHz | 20 MHz NR (Note 2) | Square (BWConfig) | 40 dB |
| NOTE 1: BWConfig is the transmission bandwidth configuration of the assumed adjacent channel carrier.  NOTE 2: With SCS that provides largest transmission bandwidth configuration (BWConfig). | | | | | |

The CACLR absolute *basic limit* is specified in table 6.6.3.5.2-5.

Table 6.6.3.5.2-5: Base station CACLR absolute *basic limit*

|  |  |
| --- | --- |
| BS category / BS class | CACLR absolute *basic limit* |
| Category A Wide Area BS | -13 dBm/MHz |
| Category B Wide Area BS | -15 dBm/MHz |
| Medium Range BS | -25 dBm/MHz |
| Local Area BS | -32 dBm/MHz |

Table 6.6.3.5.2-6: Filter parameters for the assigned channel

|  |  |
| --- | --- |
| RAT of the carrier adjacent to the sub-block or Inter RF Bandwidth gap | Filter on the assigned channel frequency and corresponding filter bandwidth |
| NR | NR of same BW with SCS that provides largest transmission bandwidth configuration |

**<Next of change>**

##### 6.6.4.5.5A Basic limits for Local Area and Medium Range BS for band n46 and n96 (Category A and B)

For Local Area and Medium Range BS operating in Band n46, basic limits for 10 MHz channel bandwidth are specified in table 6.6.4.5.5A-1. For Local Area and Medium Range BS operating in Band n46 and Band n96, basic limits for 20 MHz, 40 MHz, 60 MHz and 80 MHz channel bandwidth are specified in table 6.6.4.5.5A-2. The nominal bandwidth N = BWChannel of the transmitted carrier. For one non-transmitted channel basic limits are specified in table 6.6.4.5.5A-3, and for two non-transmitted channels basic limits are specified in table 6.6.4.5.5A-4.

Table 6.6.4.5.5A-1: Medium Range BS and Local Area BS operating band unwanted emission limits for 10 MHz channel bandwidth for band n46

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Basic limits (Note 1) | Measurement bandwidth |
| 0 MHz ≤ Δf < 0.5 MHz | 0.05 MHz ≤ f\_offset < 0.55 MHz |  | 100 kHz |
| 0.5 MHz ≤ Δf < 5 MHz | 0.55 MHz ≤ f\_offset < min(5.05 MHz, f\_offsetmax) |  | 100 kHz |
| 5 MHz ≤ Δf < min(10 MHz, Δfmax) | 5.05 MHz ≤ f\_offset < min(10.05 MHz, f\_offsetmax) |  | 100 kHz |
| 10 MHz ≤ Δf < min(85 MHz, Δfmax) | 10.05 MHz ≤ f\_offset < min(85.05 MHz, f\_offsetmax) | Max(Prated,x – 57.3dB, -40dBm) | 100 kHz |
| 85 MHz ≤ Δf < min(103 MHz, Δfmax) | 85.05 MHz ≤ f\_offset < min(103.05 MHz, f\_offsetmax) | Max(Prated,x – 59.3dB, -40dBm) | 100 kHz |
| 103 MHz ≤ Δf ≤ Δfmax | 103.05 MHz ≤ f\_offset < f\_offsetmax | Max(Prated,x – 64.3dB, -40dBm) | 100 kHz |
| NOTE 1: For a BS supporting non-contiguous spectrum operation within any operating band, the minimum requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is f ≥ 10 MHz from both adjacent sub blocks on each side of the sub-block gap, where the minimum requirement within sub-block gaps shall be Max Max(Prated,x – 57.3dB, -40dBm)/100kHz. | | | |

Table 6.6.4.5.5A-2: Medium Range BS and Local Area BS operating band unwanted emission limits for 20 MHz, 40 MHz, 60 MHz and 80 MHz channel bandwidth for band n46 and n96

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Basic limits (Note 1) | Measurement bandwidth |
| 0 MHz ≤ Δf < 1 MHz | 0.05 MHz ≤ f\_offset < 1.05 MHz |  | 100 kHz |
| 1 MHz ≤ Δf < min(0.5N MHz, Δfmax) | 1.05 MHz ≤ f\_offset < min((0.5N+0.05) MHz, f\_offsetmax) |  | 100 kHz |
| 0.5N MHz ≤ Δf < min(N MHz, Δfmax) | (0.5N+0.05) MHz ≤ f\_offset < min((N+0.05) MHz, f\_offsetmax) |  | 100 kHz |
| N MHz ≤ Δf < min(8.5N MHz, Δfmax) | (N+0.05) MHz ≤ f\_offset < min((8.5N+0.05) MHz, f\_offsetmax) |  | 100 kHz |
| 8.5N MHz ≤ Δf < min(10.3N MHz, Δfmax) | (8.5N+0.05) MHz ≤ f\_offset < min((10.3N+0.05) MHz, f\_offsetmax) |  | 100 kHz |
| 10.3N MHz ≤ Δf ≤ Δfmax | (10.3N+0.05) MHz ≤ f\_offset < f\_offsetmax |  | 100 kHz |
| NOTE 1: For a BS supporting non-contiguous spectrum operation within any operating band, the minimum requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap. Exception is f ≥ N MHz from both adjacent sub blocks on each side of the sub-block gap, where the minimum requirement within sub-block gaps shall be . | | | |

In the case of one or two non-transmitted 20 MHz channels between transmitted channels, when a NR-U channel bandwidth of 60 MHz or 80 MHz have been assigned, the spectrum emission mask for non-transmitted channels specified in Table 6.6.4.5.5A-3 and Table 6.6.4.5.5A-4 applies for one and two non-transmitted channels respectively. The spectrum emission mask for non-transmitted channels apply to frequencies (ΔfBE\_offset) starting from the edge of the last transmitted channel of the channels assigned for NR-U channel bandwidth. The relative power of any BS emission shall not exceed the most stringent levels given by Table 6.6.4.5.5A-2 and Table 6.6.4.5.5A-3 in the case of non-transmitted channels between transmitted channels.

Table 6.6.4.5.5A-3: Medium Range BS operating band unwanted emission limits for one non-transmitted channel for 60 MHz and 80MHz channel bandwidth for band n46 and n96

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, ΔfBE\_offset | Frequency offset of measurement filter centre frequency, f\_BE\_offset | *Basic limits* | Measurement bandwidth |
| 0 MHz  fBE\_offset < 1 MHz | 0.05 MHz  f\_BE\_offset < 1.05 MHz |  | 100 kHz |
| 1 MHz  fBE\_offset < 10 MHz | 1.05 MHz  f\_BE\_offset < 10.05 MHz |  | 100 kHz |
| 10 MHz  fBE\_offset < 19 MHz | 10.05 MHz  f\_BE offset < 19.05 MHz |  | 100 kHz |
| 19 MHz  fBE\_offset < 19.9 MHz | 19.05 MHz  f\_BE\_offset < 19.95 MHz |  | 100 kHz |

Table 6.6.4.5.5A-4: Medium Range BS and Local Area BS operating band unwanted emission limits for two non-transmitted channels of 80 MHz channel bandwidth for band n46 and n96

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, fBE\_offset | Frequency offset of measurement filter centre frequency, f\_BE\_offset | *Basic limits* | Measurement bandwidth |
| 0 MHz  fBE\_offset < 1 MHz | 0.05 MHz  f\_BE\_offset < 1.05 MHz |  | 100 kHz |
| 1 MHz  fBE\_offset <10 MHz | 1.05 MHz  f\_BE\_offset < 10.05 MHz |  | 100 kHz |
| 10 MHz  fBE\_offset <30 MHz | 10.05 MHz  f\_BE offset < 30.05 MHz |  | 100 kHz |
| 30 MHz  fBE\_offset < 39 MHz | 30.05 MHz  f\_BE\_offset < 39.05 MHz |  | 100 kHz |
| 39 MHz  fBE\_offset < 39.9 MHz | 39.05 MHz  f\_BE\_offset < 39.95 MHz |  | 100 kHz |

In the case of non-transmitted 20 MHz channel(s) on the edges of an assigned NR-U channel bandwidth the general spectrum emission mask specified in Table 6.6.4.5.5A-2 is applied to the remaining transmitted channels to form an additional spectrum emission mask. The additional spectrum emission mask is applied to the total bandwidth of the remaining transmitted channels.

The additional spectrum emission mask is floored a t .

The relative power of any BS emission shall not exceed the most stringent levels given by the initial general spectrum emission mask with full channel bandwidth and the additional spectrum emission mask with the channel bandwidth of the transmitted channels in the case of non-transmitted channels at the edge of an assigned NR-U channel bandwidth.

**<Next of change>**

6.6.4.5.6.5 Additional operating band unwanted emissions limits for operation with shared spectrum channel access

In addition, for operation with shared spectrum channel access, the BS may have to comply with the applicable operating band unwanted emission limits established regionally, when deployed in regions where those limits apply and under the conditions declared by the manufacturer. The regional requirements may be in the form of conducted power, power spectral density, EIRP and other types of limits. In case of regulatory limits based on EIRP, assessment of the EIRP level is described in Annex F.2.

**<Next of change>**

#### 6.6.5.5 Test requirements

##### 6.6.5.5.1 Basic limits

###### 6.6.5.5.1.1 Tx spurious emissions

The limits of either table 6.6.5.5.1.1-1 (Category A limits) or table 6.6.5.5.1.1-2 (Category B limits) shall apply. The application of either Category A or Category B limits shall be the same as for operating band unwanted emissions in clause 6.6.4, and as declared by the manufacturer (D.4).

Table 6.6.5.5.1.1-1: General BS transmitter spurious emission limits in FR1, Category A

|  |  |  |  |
| --- | --- | --- | --- |
| Spurious frequency range | *Basic limit* | Measurement bandwidth | Notes |
| 9 kHz – 150 kHz |  | 1 kHz | Note 1, Note 4 |
| 150 kHz – 30 MHz |  | 10 kHz | Note 1, Note 4 |
| 30 MHz – 1 GHz | -13 dBm | 100 kHz | Note 1 |
| 1 GHz – 12.75 GHz |  | 1 MHz | Note 1, Note 2 |
| 12.75 GHz – 5th harmonic of the upper frequency edge of the DL *operating band* in GHz |  | 1 MHz | Note 1, Note 2, Note 3 |
| 12.75 GHz - 26 GHz | -13 dBm | 1 MHz | Note 1, Note 2, Note 5 |
| NOTE 1: Measurement bandwidths as in ITU-R SM.329 [5], s4.1.  NOTE 2: Upper frequency as in ITU-R SM.329 [5], s2.5 table 1.  NOTE 3: This spurious frequency range applies only for *operating bands* for which the 5th harmonic of the upper frequency edge of the DL *operating band* is reaching beyond 12.75 GHz.  NOTE 4: This spurious frequency range applies only to *BS type 1-C* and *BS type 1-H*.  NOTE 5: Applies only for band n46 and n96. | | | |

Table 6.6.5.5.1.1-2: General BS transmitter spurious emission limits in FR1, Category B

|  |  |  |  |
| --- | --- | --- | --- |
| Spurious frequency range | *Basic limit* | Measurement bandwidth | Notes |
| 9 kHz – 150 kHz |  | 1 kHz | Note 1, Note 4 |
| 150 kHz – 30 MHz | -36 dBm | 10 kHz | Note 1, Note 4 |
| 30 MHz – 1 GHz |  | 100 kHz | Note 1 |
| 1 GHz – 12.75 GHz | -30 dBm | 1 MHz | Note 1, Note 2 |
| 12.75 GHz – 5th harmonic of the upper frequency edge of the DL *operating band* in GHz |  | 1 MHz | Note 1, Note 2, Note 3 |
| 12.75 GHz - 26 GHz | -30 dBm | 1 MHz | Note 1, Note 2, Note 5 |
| NOTE 1: Measurement bandwidths as in ITU-R SM.329 [5], s4.1.  NOTE 2: Upper frequency as in ITU-R SM.329 [5], s2.5 table 1.  NOTE 3: This spurious frequency range applies only for *operating bands* for which the 5th harmonic of the upper frequency edge of the DL *operating band* is reaching beyond 12.75 GHz.  NOTE 4: This spurious frequency range applies only to *BS type 1-C* and *BS type 1-H*.  NOTE 5: Applies only for band n46. | | | |

**<Next of change>**

###### 6.6.5.5.1.3 Additional spurious emissions requirements

These requirements may be applied for the protection of system operating in frequency ranges other than the BS downlink *operating band*. The limits may apply as an optional protection of such systems that are deployed in the same geographical area as the BS, or they may be set by local or regional regulation as a mandatory requirement for an NR *operating band*. It is in some cases not stated in the present document whether a requirement is mandatory or under what exact circumstances that a limit applies, since this is set by local or regional regulation. An overview of regional requirements in the present document is given in clause 4.4.

Some requirements may apply for the protection of specific equipment (UE, MS and/or BS) or equipment operating in specific systems (GSM, CDMA, UTRA, E-UTRA, NR, etc.) as listed below.

The power of any spurious emission shall not exceed the *basic limits* of table 6.6.5.5.1.3-1 for a BS where requirements for co-existence with the system listed in the first column apply. For a *multi-band connector*, the exclusions and conditions in the Note column of table 6.6.5.5.1.3-1 apply for each supported *operating band*.

Table 6.6.5.5.1.3-1: BS spurious emissions limits for BS for co-existence with systems operating in other frequency bands

| System type for NR to co-exist with | Frequency range for co-existence requirement | *Basic limit* | Measurement bandwidth | Note |
| --- | --- | --- | --- | --- |
| GSM900 | 921 – 960 MHz | -57 dBm | 100 kHz | This requirement does not apply to BS operating in band n8 |
|  | 876 – 915 MHz | -61 dBm | 100 kHz | For the frequency range 880-915 MHz, this requirement does not apply to BS operating in band n8, since it is already covered by the requirement in clause 6.6.5.5.1.2. |
| DCS1800 | 1805 – 1880 MHz | -47 dBm | 100 kHz | This requirement does not apply to BS operating in band n3. |
|  | 1710 – 1785 MHz | -61 dBm | 100 kHz | This requirement does not apply to BS operating in band n3, since it is already covered by the requirement in clause 6.6.5.5.1.2. |
| PCS1900 | 1930 – 1990 MHz | -47 dBm | 100 kHz | This requirement does not apply to BS operating in band n2, n25 or band n70. |
|  | 1850 – 1910 MHz | -61 dBm | 100 kHz | This requirement does not apply to BS operating in band n2 or n25 since it is already covered by the requirement in clause 6.6.5.5.1.2. |
| GSM850 or CDMA850 | 869 – 894 MHz | -57 dBm | 100 kHz | This requirement does not apply to BS operating in band n5 or n26. |
|  | 824 – 849 MHz | -61 dBm | 100 kHz | This requirement does not apply to BS operating in band n5 or n26, since it is already covered by the requirement in clause 6.6.5.5.1.2. |
| UTRA FDD Band I or | 2110 – 2170 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in band n1 or n65 |
| E-UTRA Band 1 or NR Band n1 | 1920 – 1980 MHz | -49 dBm | 1 MHz | This requirement does not apply to BS operating in band n1 or n65, since it is already covered by the requirement in clause 6.6.5.5.1.2. |
| UTRA FDD Band II or | 1930 – 1990 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in band n2 or n70. |
| E-UTRA Band 2 or NR Band n2 | 1850 – 1910 MHz | -49 dBm | 1 MHz | This requirement does not apply to BS operating in band n2, since it is already covered by the requirement in clause 6.6.5.5.1.2. |
| UTRA FDD Band III or | 1805 – 1880 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in band n3. |
| E-UTRA Band 3 or NR Band n3 | 1710 – 1785 MHz | -49 dBm | 1 MHz | This requirement does not apply to BS operating in band n3, since it is already covered by the requirement in clause 6.6.5.5.1.2. |
| UTRA FDD Band IV or | 2110 – 2155 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in band n66 |
| E-UTRA Band 4 | 1710 – 1755 MHz | -49 dBm | 1 MHz | This requirement does not apply to BS operating in band n66, since it is already covered by the requirement in clause 6.6.5.5.1.2. |
| UTRA FDD Band V or | 869 – 894 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in band n5 or n26. |
| E-UTRA Band 5 or NR Band n5 | 824 – 849 MHz | -49 dBm | 1 MHz | This requirement does not apply to BS operating in band n5 or n26, since it is already covered by the requirement in clause 6.6.5.5.1.2. |
| UTRA FDD Band VI, XIX or | 860 – 890 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in band n18. |
| E-UTRA Band 6, 18, 19 or NR Band n18 | 815 – 830 MHz | -49 dBm | 1 MHz | This requirement does not apply to BS operating in band n18, since it is already covered by the requirement in clause 6.6.5.2.2. |
|  | 830 – 845 MHz | -49 dBm | 1 MHz |  |
| UTRA FDD Band VII or | 2620 – 2690 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in band n7. |
| E-UTRA Band 7 or NR Band n7 | 2500 – 2570 MHz | -49 dBm | 1 MHz | This requirement does not apply to BS operating in band n7, since it is already covered by the requirement in clause 6.6.5.5.1.2. |
| UTRA FDD Band VIII or | 925 – 960 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in band n8. |
| E-UTRA Band 8 or NR Band n8 | 880 – 915 MHz | -49 dBm | 1 MHz | This requirement does not apply to BS operating in band n8, since it is already covered by the requirement in clause 6.6.5.5.1.2. |
| UTRA FDD Band IX or | 1844.9 – 1879.9 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in band n3. |
| E-UTRA Band 9 | 1749.9 – 1784.9 MHz | -49 dBm | 1 MHz | This requirement does not apply to BS operating in band n3, since it is already covered by the requirement in clause 6.6.5.5.1.2. |
| UTRA FDD Band X or | 2110 – 2170 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in band n66 |
| E-UTRA Band 10 | 1710 – 1770 MHz | -49 dBm | 1 MHz | This requirement does not apply to BS operating in band n66, since it is already covered by the requirement in clause 6.6.5.5.1.2. |
| UTRA FDD Band XI or XXI or | 1475.9 – 1510.9 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in Band n50, n74, n75, n92 or n94. |
| E-UTRA Band 11 or 21 | 1427.9 – 1447.9 MHz | -49 dBm | 1 MHz | This requirement does not apply to BS operating in Band n50, n51, n74, n75, n76, n91, n92, n93 or n94. |
|  | 1447.9 – 1462.9 MHz | -49 dBm | 1 MHz | This requirement does not apply to BS operating in Band n50, n74, n75, n92 or n94. |
| UTRA FDD Band XII or | 729 – 746 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in band n12. |
| E-UTRA Band 12 or NR Band n12 | 699 – 716 MHz | -49 dBm | 1 MHz | This requirement does not apply to BS operating in band n12, since it is already covered by the requirement in clause 6.6.5.5.1.2.  For NR BS operating in n29, it applies 1 MHz below the Band n29 downlink operating band (Note 5). |
| UTRA FDD Band XIII or | 746 – 756 MHz | -52 dBm | 1 MHz |  |
| E-UTRA Band 13 | 777 – 787 MHz | -49 dBm | 1 MHz |  |
| UTRA FDD Band XIV or | 758 – 768 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in band n14. |
| E-UTRA Band 14 or NR Band n14 | 788 – 798 MHz | -49 dBm | 1 MHz | This requirement does not apply to BS operating in band n14, since it is already covered by the requirement in clause 6.6.5.5.1.2 |
| E-UTRA Band 17 | 734 – 746 MHz | -52 dBm | 1 MHz |  |
|  | 704 – 716 MHz | -49 dBm | 1 MHz | For NR BS operating in n29, it applies 1 MHz below the Band n29 downlink operating band (Note 5). |
| UTRA FDD Band XX or E-UTRA Band 20 or NR Band n20 | 791 – 821 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in band n20 or n28. |
|  | 832 – 862 MHz | -49 dBm | 1 MHz | This requirement does not apply to BS operating in band n20, since it is already covered by the requirement in clause 6.6.5.5.1.2. |
| UTRA FDD Band XXII or E-UTRA Band 22 | 3510 – 3590 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in band n48, n77 or n78. |
|  | 3410 – 3490 MHz | -49 dBm | 1 MHz | This is not applicable to BS operating in Band n77 or n78. |
| E-UTRA Band 24 | 1525 – 1559 MHz | -52 dBm | 1 MHz |  |
|  | 1626.5 – 1660.5 MHz | -49 dBm | 1 MHz |  |
| UTRA FDD Band XXV or | 1930 – 1995 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in band n2, n25 or n70. |
| E-UTRA Band 25 or NR band n25 | 1850 – 1915 MHz | -49 dBm | 1 MHz | This requirement does not apply to BS operating in band n25 since it is already covered by the requirement in clause 6.6.5.5.1.2. For BS operating in Band n2, it applies for 1910 MHz to 1915 MHz, while the rest is covered in clause 6.6.5.5.1.2. |
| UTRA FDD Band XXVI or | 859 – 894 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in band n5 or n26. |
| E-UTRA Band 26 or NR Band n26 | 814 – 849 MHz | -49 dBm | 1 MHz | This requirement does not apply to BS operating in band n26 since it is already covered by the requirement in clause 6.6.5.5.1.2. For BS operating in Band n5, it applies for 814 MHz to 824 MHz, while the rest is covered in clause 6.6.5.5.1.2. |
| E-UTRA Band 27 | 852 – 869 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in Band n5. |
|  | 807 – 824 MHz | -49 dBm | 1 MHz | This requirement also applies to BS operating in Band n28, starting 4 MHz above the Band n28 downlink *operating band* (Note 5). |
| E-UTRA Band 28 or NR Band n28 | 758 – 803 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in band n20 or n28. |
|  | 703 – 748 MHz | -49 dBm | 1 MHz | This requirement does not apply to BS operating in band n28, since it is already covered by the requirement in clause 6.6.5.5.1.2. |
| E-UTRA Band 29 or NR Band n29 | 717 – 728 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in Band n29. |
| E-UTRA Band 30 or NR Band n30 | 2350 – 2360 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in band n30. |
|  | 2305 – 2315 MHz | -49 dBm | 1 MHz | This requirement does not apply to BS operating in band n30, since it is already covered by the requirement in clause 6.6.5.5.1.2. |
| E-UTRA Band 31 | 462.5 -467.5 MHz | -52 dBm | 1 MHz |  |
|  | 452.5 -457.5 MHz | -49 dBm | 1 MHz |  |
| UTRA FDD band XXXII or E-UTRA band 32 | 1452 – 1496 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in Band n50, n74, n75, n92 or n94. |
| UTRA TDD Band a) or E-UTRA Band 33 | 1900 – 1920 MHz | -52 dBm | 1 MHz |  |
| UTRA TDD Band a) or E-UTRA Band 34 or NR band n34 | 2010 – 2025 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in Band n34. |
| UTRA TDD Band b) or E-UTRA Band 35 | 1850 – 1910 MHz | -52 dBm | 1 MHz |  |
| UTRA TDD Band b) or E-UTRA Band 36 | 1930 – 1990 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in Band n2 or n25. |
| UTRA TDD Band c) or E-UTRA Band 37 | 1910 – 1930 MHz | -52 dBm | 1 MHz |  |
| UTRA TDD Band d) or E-UTRA Band 38 or NR Band n38 | 2570 – 2620 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in Band n38. |
| UTRA TDD Band f) or E-UTRA Band 39 or NR band n39 | 1880 – 1920MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in Band n39. |
| UTRA TDD Band e) or E-UTRA Band 40 or NR Band n40 | 2300 – 2400MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in Bands n30 or n40. |
| E-UTRA Band 41 or NR Band n41 | 2496 – 2690 MHz | -52 dBm | 1 MHz | This is not applicable to BS operating in Band n41 or n53. |
| E-UTRA Band 42 | 3400 – 3600 MHz | -52 dBm | 1 MHz | This is not applicable to BS operating in Band n48, n77 or n78. |
| E-UTRA Band 43 | 3600 – 3800 MHz | -52 dBm | 1 MHz | This is not applicable to BS operating in Band n48, n77 or n78. |
| E-UTRA Band 44 | 703 – 803 MHz | -52 dBm | 1 MHz | This is not applicable to BS operating in Band n28. |
| E-UTRA Band 45 | 1447 – 1467 MHz | -52 dBm | 1 MHz |  |
| E-UTRA Band 46 or NR Band n46 | 5150 – 5925 MHz | -52 dBm | 1 MHz | This is not applicable to BS operating in Band n46 or n96. |
| E-UTRA Band 47 | 5855 – 5925 MHz | -52 dBm | 1 MHz |  |
| E-UTRA Band 48 or NR Band n48 | 3550 – 3700 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in Band n48, n77 and n78. |
| E-UTRA Band 50 or NR band n50 | 1432 – 1517 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in Band n50, n51, n74, n75, n76, n91, n92, n93 or n94. |
| E-UTRA Band 51 or NR Band n51 | 1427 – 1432 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in Band n50, n51, n75, n76, n91, n92, n93 or n94. |
| E-UTRA Band 53 or NR Band n53 | 2483.5 - 2495 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in Band n41, n53 or n90. |
| E-UTRA Band 65 or NR Band n65 | 2110 – 2200 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in Band n1 or n65 |
|  | 1920 – 2010 MHz | -49 dBm | 1 MHz | For BS operating in Band n1, it applies for 1980 MHz to 2010 MHz, while the rest is covered in clause 6.6.5.5.1.2.  This requirement does not apply to BS operating in band n65, since it is already covered by the requirement in clause 6.6.5.5.1.2. |
| E-UTRA Band 66 or NR Band n66 | 2110 – 2200 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in band n66. |
|  | 1710 – 1780 MHz | -49 dBm | 1 MHz | This requirement does not apply to BS operating in band n66, since it is already covered by the requirement in clause 6.6.5.5.1.2. |
| E-UTRA Band 67 | 738 – 758 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in Band n28. |
| E-UTRA Band 68 | 753 -783 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in band n28. |
|  | 698-728 MHz | -49 dBm | 1 MHz | For BS operating in Band n28, this requirement applies between 698 MHz and 703 MHz, while the rest is covered in clause 6.6.5.5.1.2. |
| E-UTRA Band 69 | 2570 – 2620 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in Band n38. |
| E-UTRA Band 70 or NR Band n70 | 1995 – 2020 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in band n2, n25 or n70 |
|  | 1695 – 1710 MHz | -49 dBm | 1 MHz | This requirement does not apply to BS operating in band n70, since it is already covered by the requirement in clause 66.6.5.5.1.2. |
| E-UTRA Band 71 or NR Band n71 | 617 – 652 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in band n71 |
|  | 663 – 698 MHz | -49 dBm | 1 MHz | This requirement does not apply to BS operating in band n71, since it is already covered by the requirement in clause 6.6.5.5.1.2. |
| E-UTRA Band 72 | 461 – 466 MHz | -52 dBm | 1 MHz |  |
|  | 451 – 456 MHz | -49 dBm | 1 MHz |  |
| E-UTRA Band 74 or NR Band n74 | 1475 – 1518 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in Band n50, n75, n75, n92 or n94. |
|  | 1427 – 1470 MHz | -49 dBm | 1MHz | This requirement does not apply to BS operating in Band n50, n51, n74, n75, n76, n91, n92, n93 or n94. |
| E-UTRA Band 75 or NR Band n75 | 1432 – 1517 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in Band n50, n51, n74, n75, n76, n91, n92, n93 or n94. |
| E-UTRA Band 76 or NR Band n76 | 1427 – 1432 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in Band n50, n51, n75, n76, n91, n92, n93 or n94. |
| NR Band n77 | 3.3 – 4.2 GHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in Band n48, n77 or n78 |
| NR Band n78 | 3.3 – 3.8 GHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in Band n48, n77 or n78 |
| NR Band n79 | 4.4 – 5.0 GHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in Band n79 |
| NR Band n80 | 1710 – 1785 MHz | -49 dBm | 1 MHz | This requirement does not apply to BS operating in band n3, since it is already covered by the requirement in clause 6.6.5.5.1.2. |
| NR Band n81 | 880 – 915 MHz | -49 dBm | 1 MHz | This requirement does not apply to BS operating in band n8, since it is already covered by the requirement in clause 6.6.5.5.1.2. |
| NR Band n82 | 832 – 862 MHz | -49 dBm | 1 MHz | This requirement does not apply to BS operating in band n20, since it is already covered by the requirement in clause 6.6.5.5.1.2. |
| NR Band n83 | 703 – 748 MHz | -49 dBm | 1 MHz | This requirement does not apply to BS operating in band n28, since it is already covered by the requirement in clause 6.6.5.5.1.2. |
| NR Band n84 | 1920 – 1980 MHz | -49 dBm | 1 MHz | This requirement does not apply to BS operating in band n1, since it is already covered by the requirement in clause 6.6.5.5.1.2. |
| E-UTRA Band 85 | 728 - 746 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in band n12. |
|  | 698 - 716 MHz | -49 dBm | 1 MHz | This requirement does not apply to BS operating in band n12, since it is already covered by the requirement in clause 6.6.5.5.1.2.  For NR BS operating in n29, it applies 1 MHz below the Band n29 downlink operating band (Note 5). |
| NR Band n86 | 1710 – 1780 MHz | -49 dBm | 1 MHz | This requirement does not apply to BS operating in band n66, since it is already covered by the requirement in clause 6.6.5.5.1.2. |
| NR Band n89 | 824 – 849 MHz | -49 dBm | 1 MHz | This requirement does not apply to BS operating in band n5, since it is already covered by the requirement in clause 6.6.5.5.1.2. |
| NR Band n91 | 1427 – 1432 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in Band n50, n51, n75 or n76. |
|  | 832 – 862 MHz | -49 dBm | 1 MHz | This requirement does not apply to BS operating in band n20, since it is already covered by the requirement in clause 6.6.5.5.1.2. |
| NR Band n92 | 1432 – 1517 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in Band n50, n51, n74, n75 or n76. |
|  | 832 – 862 MHz | -49 dBm | 1 MHz | This requirement does not apply to BS operating in band n20, since it is already covered by the requirement in clause 6.6.5.5.1.2. |
| NR Band n93 | 1427 – 1432 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in Band n50, n51, n75 or n76. |
|  | 880 – 915 MHz | -49 dBm | 1 MHz | This requirement does not apply to BS operating in band n8, since it is already covered by the requirement in clause 6.6.5.5.1.2. |
| NR Band n94 | 1432 – 1517 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in Band n50, n51, n74, n75 or n76. |
|  | 880 – 915 MHz | -49 dBm | 1 MHz | This requirement does not apply to BS operating in band n8, since it is already covered by the requirement in clause 6.6.5.5.1.2. |
| NR Band n95 | 2010 – 2025 MHz | -52 dBm | 1 MHz |  |
| NR Band n96 | 5925 – 7125 MHz | -52 dBm | 1 MHz | This requirement does not apply to BS operating in Band n46 or n96. |

NOTE 1: As defined in the scope for spurious emissions in this clause, except for the cases where the noted requirements apply to a BS operating in Band n28, the co-existence requirements in table 6.6.5.5.1.3-1do not apply for the ΔfOBUE frequency range immediately outside the downlink *operating band* (see TS 38.104 [2], table 5.2-1). Emission limits for this excluded frequency range may be covered by local or regional requirements.

NOTE 2: Table 6.6.5.5.1.3-1 assumes that two *operating bands*, where the frequency ranges in TS 38.104 [2], table 5.2-1 would be overlapping, are not deployed in the same geographical area. For such a case of operation with overlapping frequency arrangements in the same geographical area, special co-existence requirements may apply that are not covered by the 3GPP specifications.

NOTE 3: TDD base stations deployed in the same geographical area, that are synchronized and use the same or adjacent *operating bands* can transmit without additional co-existence requirements. For unsynchronized base stations, special co-existence requirements may apply that are not covered by the 3GPP specifications.

NOTE 4: For Band n28 BS, specific solutions may be required to fulfil the spurious emissions limits for BS for co-existence with E-UTRA Band 27 UL *operating band*.

NOTE 5: For NR Band n29 BS, specific solutions may be required to fulfil the spurious emissions limits for NR BS for co-existence with UTRA Band XII, E-UTRA Band 12 or NR Band n12 UL operating band, E-UTRA Band 17 UL operating band or E-UTRA Band 85 UL operating band.

The following requirement may be applied for the protection of PHS. This requirement is also applicable at specified frequencies falling between ΔfOBUE below the lowest BS transmitter frequency of the downlink *operating band* and ΔfOBUE above the highest BS transmitter frequency of the downlink *operating band*. ΔfOBUE is defined in clause 6.6.1.

The *basic limits* for this requirement is:

Table 6.6.5.5.1.3-2: BS spurious emissions *basic limits* for BS for co-existence with PHS

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency range | Basic limit | Measurement bandwidth | Note |
| 1884.5 – 1915.7 MHz | -41 dBm | 300 kHz | Applicable when co-existence with PHS system operating in 1884.5 - 1915.7 MHz |

Table 6.6.5.5.1.3-3: Void

In certain regions, the following requirement may apply to BS operating in Band n50 and n75 within 1432-1452 MHz, and in Band n51 and Band n76. The *basic limits* are specified in table 6.6.5.5.1.3-4. This requirement is also applicable at the frequency range from ΔfOBUE below the lowest frequency of the BS downlink *operating band* up to ΔfOBUE above the highest frequency of the BS downlink *operating band*.

Table 6.6.5.5.1.3-4: Additional operating band unwanted emission *basic limits* for BS operating in Band n50 and n75 within 1432-1452 MHz, and in Band 51 and 76

|  |  |  |
| --- | --- | --- |
| Filter centre frequency, filter | Basic limit | Measurement bandwidth |
| Ffilter = 1413.5 MHz | -42 dBm | 27 MHz |

In certain regions, the following requirement may apply to BS operating in NR Band n50 within 1492-1517 MHz. The maximum level of emissions, measured on centre frequencies Ffilter with filter bandwidth according to table 6.6.5.5.1.3-5, shall be defined according to the *basic limits* PEM,n50,a and PEM,B50,b declared by the manufacturer.

Table 6.6.5.5.1.3-5: Operating band n50, n74 and n75 declared emission above 1518 MHz

|  |  |  |
| --- | --- | --- |
| Filter centre frequency, Ffilter | Declared emission *basic limit* (dBm) | Measurement bandwidth |
| 1518.5 MHz ≤ Ffilter ≤ 1519.5 MHz | PEM, n50,a | 1 MHz |
| 1520.5 MHz ≤ Ffilter ≤ 1558.5 MHz | PEM,n50,b | 1 MHz |

NOTE: The regional requirement, included in ECC/DEC/(17)06 [14], is defined in terms of EIRP, which is dependent on both the BS emissions at the antenna connector and the deployment (including antenna gain and feeder loss). The requirement defined above provides the characteristics of the base station needed to verify compliance with the regional requirement. The assessment of the EIRP level is described in TS 38.104 [2] annex E.

In certain regions, the following requirement shall be applied to BS operating in Band n14 to ensure that appropriate interference protection is provided to 700 MHz public safety operations. This requirement is also applicable at the frequency range from 10 MHz below the lowest frequency of the BS downlink operating band up to 10 MHz above the highest frequency of the BS downlink operating band.

The power of any spurious emission shall not exceed:

Table 6.6.5.5.1.3-6: BS Spurious emissions limits for protection of 700 MHz public safety operations

|  |  |  |  |
| --- | --- | --- | --- |
| Operating Band | Frequency range | Maximum Level | Measurement Bandwidth |
| n14 | 769 – 775 MHz | -46 dBm | 6.25 kHz |
| n14 | 799 – 805 MHz | -46 dBm | 6.25 kHz |

The following requirement may apply to NR BS operating in Band n30 in certain regions. This requirement is also applicable at the frequency range from 10 MHz below the lowest frequency of the BS downlink operating band up to 10 MHz above the highest frequency of the BS downlink operating band.

The power of any spurious emission shall not exceed:

Table 6.6.5.5.1.3-7: Additional NR BS Spurious emissions limits for Band n30

|  |  |  |
| --- | --- | --- |
| Frequency range | Basic limit | Measurement bandwidth |
| 2200 – 2345 MHz | -45 dBm |  |
| 2362.5 – 2365 MHz | -25 dBm |  |
| 2365 – 2367.5 MHz | -40 dBm | 1 MHz |
| 2367.5 – 2370 MHz | -42 dBm |  |
| 2370 – 2395 MHz | -45 dBm |  |

The following requirement may apply to BS operating in Band n48 in certain regions. The power of any spurious emission shall not exceed:

Table 6.6.5.2.3-8: Additional BS Spurious emissions limits for Band n48

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency range | Maximum Level | Measurement Bandwidth (NOTE) | Note |
| 3530MHz – 3720MHz | -25dBm | 1 MHz | Applicable 10MHz from the assigned channel edge |
| 3100MHz – 3530MHz  3720MHz – 4200MHz | -40dBm | 1 MHz |  |

NOTE: The resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

The following requirement shall be applied to BS operating in Band n26 to ensure that appropriate interference protection is provided to 800 MHz public safety operations. This requirement is also applicable at the frequency range from 10 MHz below the lowest frequency of the BS downlink operating band up to 10 MHz above the highest frequency of the BS downlink operating band.

The power of any spurious emission shall not exceed:

Table 6.6.5.2.3-9: BS Spurious emissions limits for protection of 800 MHz public safety operations

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Operating Band | Frequency range | Maximum Level | Measurement Bandwidth | Note |
| n26 | 851 - 859 MHz | -13 dBm | 100 kHz | Applicable for offsets > 37.5kHz from the channel edge |

The following requirement may apply to BS for Band n41 and n90 operation in Japan. This requirement is also applicable at the frequency range from ΔfOBUE below the lowest frequency of the BS downlink operating band up to ΔfOBUE above the highest frequency of the BS downlink operating band.

The power of any spurious emission shall not exceed:

Table 6.6.5.5.1.3-10: Additional BS Spurious emissions limits for Band n41 and n90

|  |  |  |
| --- | --- | --- |
| Frequency range | *Basic limit* | *Measurement Bandwidth* |
| 2505 MHz – 2535 MHz | -42 dBm | 1 MHz |
| NOTE: This requirement applies for carriers allocated within 2545-2645 MHz. | | |

###### 6.6.5.5.1.4 Co-location with other base stations

These requirements may be applied for the protection of other BS receivers when GSM900, DCS1800, PCS1900, GSM850, CDMA850, UTRA FDD, UTRA TDD, E-UTRA and/or NR BS are co-located with a BS.

The requirements assume a 30 dB coupling loss between transmitter and receiver and are based on co-location with base stations of the same class.

The *basic limits* are in table 6.6.5.5.1.4-1 for a BS where requirements for co-location with a BS type listed in the first column apply, depending on the declared BS class (D.2). For a *multi-band connector*, the exclusions and conditions in the Note column of table 6.6.5.5.1.4-1 shall apply for each supported *operating band*.

Table 6.6.5.5.1.4-1: BS spurious emissions *basic limits* for BS co-located with another BS

| Type of co-located BS | Frequency range for | Basic limit | | | Measurement | Note |
| --- | --- | --- | --- | --- | --- | --- |
|  | co-location requirement | WA BS | MR BS | LA BS | bandwidth |  |
| GSM900 | 876-915 MHz | -98 dBm | -91 dBm | -70 dBm | 100 kHz |  |
| DCS1800 | 1710 – 1785 MHz | -98 dBm | -91 dBm | -80 dBm | 100 kHz |  |
| PCS1900 | 1850 – 1910 MHz | -98 dBm | -91 dBm | -80 dBm | 100 kHz |  |
| GSM850 or CDMA850 | 824 – 849 MHz | -98 dBm | -91 dBm | -70 dBm | 100 kHz |  |
| UTRA FDD Band I or E-UTRA Band 1 or NR Band n1 | 1920 – 1980 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| UTRA FDD Band II or E-UTRA Band 2 or NR Band n2 | 1850 – 1910 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| UTRA FDD Band III or E-UTRA Band 3 or NR Band n3 | 1710 – 1785 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| UTRA FDD Band IV or E-UTRA Band 4 | 1710 – 1755 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| UTRA FDD Band V or E-UTRA Band 5 or NR Band n5 | 824 – 849 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| UTRA FDD Band VI, XIX or E-UTRA Band 6, 19 | 830 – 845 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| UTRA FDD Band VII or E-UTRA Band 7 or NR Band n7 | 2500 – 2570 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| UTRA FDD Band VIII or E-UTRA Band 8 or NR Band n8 | 880 – 915 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| UTRA FDD Band IX or E-UTRA Band 9 | 1749.9 – 1784.9 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| UTRA FDD Band X or E-UTRA Band 10 | 1710 – 1770 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| UTRA FDD Band XI or E-UTRA Band 11 | 1427.9 –1447.9 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz | This is not applicable to BS operating in Band n50, n75, n91, n92, n93 or n94 |
| UTRA FDD Band XII or  E-UTRA Band 12 or NR Band n12 | 699 – 716 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| UTRA FDD Band XIII or  E-UTRA Band 13 | 777 – 787 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| UTRA FDD Band XIV or  E-UTRA Band 14 or NR Band n14 | 788 – 798 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| E-UTRA Band 17 | 704 – 716 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| E-UTRA Band 18 or NR Band n18 | 815 – 830 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| UTRA FDD Band XX or E-UTRA Band 20 or NR Band n20 | 832 – 862 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| UTRA FDD Band XXI or E-UTRA Band 21 | 1447.9 – 1462.9 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz | This is not applicable to BS operating in Band n50, n75, n92 or n94 |
| UTRA FDD Band XXII or E-UTRA Band 22 | 3410 – 3490 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz | This is not applicable to BS operating in Band n48, n77 or n78 |
| E-UTRA Band 23 | 2000 – 2020 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| E-UTRA Band 24 | 1626.5 – 1660.5 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| UTRA FDD Band XXV or  E-UTRA Band 25 or NR Band n25 | 1850 – 1915 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| UTRA FDD Band XXVI or  E-UTRA Band 26 or NR Band n26 | 814 – 849 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| E-UTRA Band 27 | 807 – 824 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| E-UTRA Band 28 or NR Band n28 | 703 – 748 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| E-UTRA Band 30 or NR Band n30 | 2305 – 2315 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| E-UTRA Band 31 | 452.5 -457.5 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| UTRA TDD Band a) or E-UTRA Band 33 | 1900 – 1920 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| UTRA TDD Band a) or E-UTRA Band 34 or NR band n34 | 2010 – 2025 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz | This is not applicable to BS operating in Band n34 |
| UTRA TDD Band b) or E-UTRA Band 35 | 1850 – 1910 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| UTRA TDD Band b) or E-UTRA Band 36 | 1930 – 1990 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz | This is not applicable to BS operating in Band n2 or band n25 |
| UTRA TDD Band c) or E-UTRA Band 37 | 1910 – 1930 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| UTRA TDD Band d) or E-UTRA Band 38 or NR Band n38 | 2570 – 2620 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz | This is not applicable to BS operating in Band n38. |
| UTRA TDD Band f) or E-UTRA Band 39 or NR band n39 | 1880 – 1920MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz | This is not applicable to BS operating in Band n39 |
| UTRA TDD Band e) or E-UTRA Band 40 or NR Band n40 | 2300 – 2400MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz | This is not applicable to BS operating in Bands n30 or n40. |
| E-UTRA Band 41 or NR Band n41 | 2496 – 2690 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz | This is not applicable to BS operating in Band n41 or n53 |
| E-UTRA Band 42 | 3400 – 3600 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz | This is not applicable to BS operating in Band n48, n77 or n78 |
| E-UTRA Band 43 | 3600 – 3800 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz | This is not applicable to BS operating in Band n48, n77 or n78 |
| E-UTRA Band 44 | 703 – 803 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz | This is not applicable to BS operating in Band n28 |
| E-UTRA Band 45 | 1447 – 1467 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| E-UTRA Band 46 or NR Band n46 | 5150 – 5925 MHz | N/A | -91 dBm | -88 dBm | 100 kHz | This is not applicable to BS operating in Band n46 or n96 |
| E-UTRA Band 48 or NR Band n48 | 3550 – 3700 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz | This is not applicable to BS operating in Band n48, n77 or n78 |
| E-UTRA Band 50 or NR band n50 | 1432 – 1517 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz | This is not applicable to BS operating in Band n51, n74, n75, n91, n92, n93 or n94 |
| E-UTRA Band 51 or NR Band n51 | 1427 – 1432 MHz | N/A | N/A | -88 dBm | 100 kHz | This is not applicable to BS operating in Band n50, n74, n75, n76, n91, n92, n93 or n94 |
| E-UTRA Band 53 or NR Band n53 | 2483.5 – 2495 MHz | N/A | -91 dBm | -88 dBm | 100 kHz | This is not applicable to BS operating in Band n41, n53 or n90 |
| E-UTRA Band 65 or NR Band n65 | 1920 – 2010 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| E-UTRA Band 66 or NR Band n66 | 1710 – 1780 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| E-UTRA Band 68 | 698 – 728 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| E-UTRA Band 70 or NR Band n70 | 1695 – 1710 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| E-UTRA Band 71 or NR Band n71 | 663 – 698 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| E-UTRA Band 72 | 451 – 456 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| E-UTRA Band 74 or NR Band n74 | 1427 – 1470 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz | This is not applicable to BS operating in Band n50, n51, n91, n92, n93 or n94 |
| NR Band n77 | 3.3 – 4.2 GHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz | This is not applicable to BS operating in Band n48, n77 or n78 |
| NR Band n78 | 3.3 – 3.8 GHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz | This is not applicable to BS operating in Band n48, n77 or n78 |
| NR Band n79 | 4.4 – 5.0 GHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| NR Band n80 | 1710 – 1785 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| NR Band n81 | 880 – 915 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| NR Band n82 | 832 – 862 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| NR Band n83 | 703 – 748 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| NR Band n84 | 1920 – 1980 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| E-UTRA Band 85 | 698 - 716 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| NR Band n86 | 1710 – 1780 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| NR Band n89 | 824 – 849 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| NR Band n91 | 832 – 862 MHz | N/A | N/A | -88 dBm | 100 kHz |  |
| NR Band n92 | 832 – 862 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| NR Band n93 | 880 – 915 MHz | N/A | N/A | -88 dBm | 100 kHz |  |
| NR Band n94 | 880 – 915 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| NR Band n95 | 2010 – 2025 MHz | -96 dBm | -91 dBm | -88 dBm | 100 kHz |  |
| NR Band n96 | 5925 – 7125 MHz | N/A | -90 dBm | -87 dBm | 100 kHz | This is not applicable to BS operating in Band n46 or n96 |

NOTE 1: As defined in the scope for spurious emissions in this clause, the co-location requirements in table 6.6.5.5.1.4-1 do not apply for the frequency range extending ΔfOBUE immediately outside the BS transmit frequency range of a downlink *operating band* (see TS 38.104 [2] table 5.2-1). The current state-of-the-art technology does not allow a single generic solution for co-location with other system on adjacent frequencies for 30dB BS-BS minimum coupling loss. However, there are certain site-engineering solutions that can be used. These techniques are addressed in TR 25.942 [15].

NOTE 2: Table 6.6.5.5.1.4-1 assumes that two *operating bands*, where the corresponding BS transmit and receive frequency ranges in TS 38.104 [2] table 5.2-1 would be overlapping, are not deployed in the same geographical area. For such a case of operation with overlapping frequency arrangements in the same geographical area, special co-location requirements may apply that are not covered by the 3GPP specifications.

NOTE 3: Co-located TDD base stations that are synchronized and using the same or adjacent *operating band* can transmit without special co-locations requirements. For unsynchronized base stations, special co-location requirements may apply that are not covered by the 3GPP specifications.

**<Next of change>**

### 7.2.5 Test requirements

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel as specified in annex A.1 with parameters specified in table 7.2.5-1 for Wide Area BS, in table 7.2.5-2 for Medium Range BS and in table 7.2.5-3 for Local Area BS in any operating band except for band n46 and n96.

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel as specified in annex A.2 with parameters specified in table 7.2.5-2a for Medium Range BS and in table 7.3.5-3a for Local Area BS, for band n46.

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel as specified in annex A.2 with parameters specified in table 7.2.5-2b for Medium Range BS and in table 7.2.5-3b for Local Area BS, for band n96.

The reference sensitivity level requirements for NB-IoT are specified in clause 7.2.5 of TS 36.141 [24].

Table 7.2.5-1: NR Wide Area BS reference sensitivity levels

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *BS channel* | Sub-carrier | Reference | Reference sensitivity power level, PREFSENS (dBm) | | |
| *bandwidth* (MHz) | spacing (kHz) | measurement channel | f ≤ 3.0 GHz | 3.0 GHz < f ≤ 4.2 GHz | 4.2 GHz < f ≤ 6.0 GHz |
| 5, 10, 15 | 15 | G-FR1-A1-1 (Note 1) | -101 | -100.7 | -100.5 |
|  |  | G-FR1-A1-10 (Note 3) | -101 (Note 2) | -100.7 (Note 2) | -100.5 (Note 2) |
| 10, 15 | 30 | G-FR1-A1-2 (Note 1) | -101.1 | -100.8 | -100.6 |
| 10, 15 | 60 | G-FR1-A1-3 (Note 1) | -98.2 | -97.9 | -97.7 |
| 20, 25, 30, 40, | 15 | G-FR1-A1-4 (Note 1) | -94.6 | -94.3 | -94.1 |
| 50 |  | G-FR1-A1-11 (Note 4) | -94.6 (Note 2) | -94.3 (Note 2) | -94.1 (Note 2) |
| 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 30 | G-FR1-A1-5 (Note 1) | -94.9 | -94.6 | -94.4 |
| 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 60 | G-FR1-A1-6 (Note 1) | -95 | -94.7 | -94.5 |
| NOTE 1: PREFSENS is the power level of a single instance of the reference measurement channel. This requirement shall be met for each consecutive application of a single instance of the reference measurement channel mapped to disjoint frequency ranges with a width corresponding to the number of resource blocks of the reference measurement channel each, except for one instance that might overlap one other instance to cover the full *BS channel bandwidth*.  NOTE 2: The requirements apply to BS that supports NB-IoT operation in NR in-band.  NOTE 3: PREFSENS is the power level of a single instance of the reference measurement channel. This requirement shall be met for a single instance of G-FR1-A1-10 mapped to the 24 NR resource blocks adjacent to the NB-IoT PRB, and for each consecutive application of a single instance of G-FR1-A1-1 mapped to disjoint frequency ranges with a width of 25 resource blocks each.  NOTE 4: PREFSENS is the power level of a single instance of the reference measurement channel. This requirement shall be met for a single instance of G-FR1-A1-11 mapped to the 105 NR resource blocks adjacent to the NB-IoT PRB, and for each consecutive application of a single instance of G-FR1-A1-4 mapped to disjoint frequency ranges with a width of 106 resource blocks each. | | | | | |

Table 7.2.5-2: NR Medium Range BS reference sensitivity levels

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *BS channel* | Sub-carrier | Reference | Reference sensitivity power level, PREFSENS (dBm) | | |
| *bandwidth* (MHz) | spacing (kHz) | measurement channel  (Note 5) | f ≤ 3.0 GHz | 3.0 GHz < f ≤ 4.2 GHz | 4.2 GHz < f ≤ 6.0 GHz |
| 5, 10, 15 | 15 | G-FR1-A1-1 (Note 1) | -96 | -95.7 | -95.5 |
|  |  | G-FR1-A1-10 (Note 3) | -96 (Note 2) | -95.7 (Note 2) | -95.5 (Note 2) |
| 10, 15 | 30 | G-FR1-A1-2 (Note 1) | -96.1 | -95.8 | -95.6 |
| 10, 15 | 60 | G-FR1-A1-3 (Note 1) | -93.2 | -92.9 | -92.7 |
| 20, 25, 30, 40, | 15 | G-FR1-A1-4 (Note 1) | -89.6 | -89.3 | -89.1 |
| 50 |  | G-FR1-A1-11 (Note 4) | -89.6 (Note 2) | -89.3 (Note 2) | -89.1 (Note 2) |
| 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 30 | G-FR1-A1-5 (Note 1) | -89.9 | -89.6 | -89.4 |
| 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 60 | G-FR1-A1-6 (Note 1) | -90 | -89.7 | -89.5 |
| NOTE 1: PREFSENS is the power level of a single instance of the reference measurement channel. This requirement shall be met for each consecutive application of a single instance of the reference measurement channel mapped to disjoint frequency ranges with a width corresponding to the number of resource blocks of the reference measurement channel each, except for one instance that might overlap one other instance to cover the full *BS channel bandwidth*.  NOTE 2: The requirements apply to BS that supports NB-IoT operation in NR in-band.  NOTE 3: PREFSENS is the power level of a single instance of the reference measurement channel. This requirement shall be met for a single instance of G-FR1-A1-10 mapped to the 24 NR resource blocks adjacent to the NB-IoT PRB, and for each consecutive application of a single instance of G-FR1-A1-1 mapped to disjoint frequency ranges with a width of 25 resource blocks each.  NOTE 4: PREFSENS is the power level of a single instance of the reference measurement channel. This requirement shall be met for a single instance of G-FR1-A1-11 mapped to the 105 NR resource blocks adjacent to the NB-IoT PRB, and for each consecutive application of a single instance of G-FR1-A1-4 mapped to disjoint frequency ranges with a width of 106 resource blocks each.  NOTE 5: These reference measurement channels are not applied for band n46 and n96. | | | | | |

Table 7.2.5-2a: NR Medium Range BS reference sensitivity levels for band n46

|  |  |  |  |
| --- | --- | --- | --- |
| *BS channel bandwidth* (MHz) | Sub-carrier spacing (kHz) | Reference measurement channel | **Reference sensitivity power level, PREFSENS**  (dBm) |
| 10 | 15 | G-FR1-A1-12 (NOTE 2) | -101.5 |
| 30 | G-FR1-A1-13 (NOTE 2) | -99.2 |
| 60 | G-FR1-A1-3 (NOTE 1) | -92.4 |
| 20 | 15 | G-FR1-A1-14 (NOTE 2) | -98.6 |
| 30 | G-FR1-A1-15 (NOTE 2) | -95.6 |
| 60 | G-FR1-A1-6 (NOTE 1) | -89.2 |
| 40 | 15 | G-FR1-A1-16 (NOTE 2) | -95.5 |
| 30 | G-FR1-A1-17 (NOTE 2) | -92.5 |
| 60 | G-FR1-A1-6 (NOTE 1) | -89.2 |
| 60 | 30 | G-FR1-A1-18 (NOTE 2) | -90.9 |
| 60 | G-FR1-A1-6 (NOTE 1) | -89.2 |
| 80 | 30 | G-FR1-A1-19 (NOTE 2) | -89.6 |
| 60 | G-FR1-A1-6 (NOTE 1) | -89.2 |
| NOTE 1: PREFSENS is the power level of a single instance of the reference measurement channel. This requirement shall be met for each consecutive application of a single instance of the reference measurement channel mapped to disjoint frequency ranges with a width corresponding to the number of resource blocks of the reference measurement channel each, except for one instance that might overlap one other instance to cover the full *BS channel bandwidth*.  NOTE 2: PREFSENS is the power level of a single instance of the reference measurement channel. This requirement shall be met for each single interlace of FRC G-FR1-A1-12 and G-FR1-A1-19, except for one instance that might overlap one other instance to cover the full *BS channel bandwidth*. | | | |

Table 7.2.5-2b: NR Medium Range BS reference sensitivity levels for band n96

|  |  |  |  |
| --- | --- | --- | --- |
| *BS channel bandwidth* (MHz) | Sub-carrier spacing (kHz) | Reference measurement channel | **Reference sensitivity power level, PREFSENS**  (dBm) |
| 20 | 15 | G-FR1-A1-14 (NOTE 2) | -97.6 |
| 30 | G-FR1-A1-15 (NOTE 2) | -94.6 |
| 60 | G-FR1-A1-6 (NOTE 1) | -88.2 |
| 40 | 15 | G-FR1-A1-16 (NOTE 2) | -94.5 |
| 30 | G-FR1-A1-17 (NOTE 2) | -91.5 |
| 60 | G-FR1-A1-6 (NOTE 1) | -88.2 |
| 60 | 30 | G-FR1-A1-18 (NOTE 2) | -89.9 |
| 60 | G-FR1-A1-6 (NOTE 1) | -88.2 |
| 80 | 30 | G-FR1-A1-19 (NOTE 2) | -88.6 |
| 60 | G-FR1-A1-6 (NOTE 1) | -88.2 |
| NOTE 1: PREFSENS is the power level of a single instance of the reference measurement channel. This requirement shall be met for each consecutive application of a single instance of the reference measurement channel mapped to disjoint frequency ranges with a width corresponding to the number of resource blocks of the reference measurement channel each, except for one instance that might overlap one other instance to cover the full *BS channel bandwidth*.  NOTE 2: PREFSENS is the power level of a single instance of the reference measurement channel. This requirement shall be met for each single interlace of FRC G-FR1-A1-12 and G-FR1-A1-19, except for one instance that might overlap one other instance to cover the full *BS channel bandwidth*. | | | |

Table 7.2.5-3: NR Local Area BS reference sensitivity levels

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *BS channel* | Sub-carrier | Reference | Reference sensitivity power level, PREFSENS (dBm) | | |
| *bandwidth* (MHz) | spacing (kHz) | measurement channel  (Note 5) | f ≤ 3.0 GHz | 3.0 GHz < f ≤ 4.2 GHz | 4.2 GHz < f ≤ 6.0 GHz |
| 5, 10, 15 | 15 | G-FR1-A1-1 (Note 1) | -93 | -92.7 | -92.5 |
|  |  | G-FR1-A1-10 (Note 3) | -93 (Note 2) | -92.7 (Note 2) | -92.5 (Note 2) |
| 10, 15 | 30 | G-FR1-A1-2 (Note 1) | -93.1 | -92.8 | -92.6 |
| 10, 15 | 60 | G-FR1-A1-3 (Note 1) | -90.2 | -89.9 | -89.7 |
| 20, 25, 30, 40, | 15 | G-FR1-A1-4 (Note 1) | -86.6 | -86.3 | -86.1 |
| 50 |  | G-FR1-A1-11 (Note 4) | -86.6 (Note 2) | -86.3 (Note 2) | -86.1 (Note 2) |
| 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 30 | G-FR1-A1-5 (Note 1) | -86.9 | -86.6 | -86.4 |
| 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 60 | G-FR1-A1-6 (Note 1) | -87 | -86.7 | -86.5 |
| NOTE 1: PREFSENS is the power level of a single instance of the reference measurement channel. This requirement shall be met for each consecutive application of a single instance of the reference measurement channel mapped to disjoint frequency ranges with a width corresponding to the number of resource blocks of the reference measurement channel each, except for one instance that might overlap one other instance to cover the full *BS channel bandwidth*.  NOTE 2: The requirements apply to BS that supports NB-IoT operation in NR in-band.  NOTE 3: PREFSENS is the power level of a single instance of the reference measurement channel. This requirement shall be met for a single instance of G-FR1-A1-10 mapped to the 24 NR resource blocks adjacent to the NB-IoT PRB, and for each consecutive application of a single instance of G-FR1-A1-1 mapped to disjoint frequency ranges with a width of 25 resource blocks each.  NOTE 4: PREFSENS is the power level of a single instance of the reference measurement channel. This requirement shall be met for a single instance of G-FR1-A1-11 mapped to the 105 NR resource blocks adjacent to the NB-IoT PRB, and for each consecutive application of a single instance of G-FR1-A1-4 mapped to disjoint frequency ranges with a width of 106 resource blocks each.  NOTE 5: These reference measurement channels are not applied for band n46 and n96. | | | | | |

Table 7.2.5-3a: NR Local Area BS reference sensitivity levels for band n46

|  |  |  |  |
| --- | --- | --- | --- |
| *BS channel bandwidth* (MHz) | Sub-carrier spacing (kHz) | Reference measurement channel | **Reference sensitivity power level, PREFSENS**  (dBm) |
| 10 | 15 | G-FR1-A1-12 (NOTE 2) | -98.5 |
|  | 30 | G-FR1-A1-13 (NOTE 2) | -96.2 |
|  | 60 | G-FR1-A1-3 (NOTE 1) | -89.4 |
| 20 | 15 | G-FR1-A1-14 (NOTE 2) | -95.6 |
|  | 30 | G-FR1-A1-15 (NOTE 2) | -92.6 |
|  | 60 | G-FR1-A1-6 (NOTE 1) | -86.2 |
| 40 | 15 | G-FR1-A1-16 (NOTE 2) | -92.5 |
|  | 30 | G-FR1-A1-17 (NOTE 2) | -89.5 |
|  | 60 | G-FR1-A1-6 (NOTE 1) | -86.2 |
| 60 | 30 | G-FR1-A1-18 (NOTE 2) | -87.9 |
|  | 60 | G-FR1-A1-6 (NOTE 1) | -86.2 |
| 80 | 30 | G-FR1-A1-19 (NOTE 2) | -86.6 |
|  | 60 | G-FR1-A1-6 (NOTE 1) | -86.2 |
| NOTE 1: PREFSENS is the power level of a single instance of the reference measurement channel. This requirement shall be met for each consecutive application of a single instance of the reference measurement channel mapped to disjoint frequency ranges with a width corresponding to the number of resource blocks of the reference measurement channel each, except for one instance that might overlap one other instance to cover the full BS channel bandwidth.  NOTE 2: PREFSENS is the power level of a single instance of the reference measurement channel. This requirement shall be met for each single interlace of FRC G-FR1-A1-12 and G-FR1-A1-19, except for one instance that might overlap one other instance to cover the full *BS channel bandwidth*. | | | |

Table 7.2.5-3b: NR Local Area BS reference sensitivity levels for band n96

|  |  |  |  |
| --- | --- | --- | --- |
| *BS channel bandwidth* (MHz) | Sub-carrier spacing (kHz) | Reference measurement channel | **Reference sensitivity power level, PREFSENS**  (dBm) |
| 20 | 15 | G-FR1-A1-14 (NOTE 2) | -94.6 |
|  | 30 | G-FR1-A1-15 (NOTE 2) | -91.6 |
|  | 60 | G-FR1-A1-6 (NOTE 1) | -85.2 |
| 40 | 15 | G-FR1-A1-16 (NOTE 2) | -91.5 |
|  | 30 | G-FR1-A1-17 (NOTE 2) | -88.5 |
|  | 60 | G-FR1-A1-6 (NOTE 1) | -85.2 |
| 60 | 30 | G-FR1-A1-18 (NOTE 2) | -86.9 |
|  | 60 | G-FR1-A1-6 (NOTE 1) | -85.2 |
| 80 | 30 | G-FR1-A1-19 (NOTE 2) | -85.6 |
|  | 60 | G-FR1-A1-6 (NOTE 1) | -85.2 |
| NOTE 1: PREFSENS is the power level of a single instance of the reference measurement channel. This requirement shall be met for each consecutive application of a single instance of the reference measurement channel mapped to disjoint frequency ranges with a width corresponding to the number of resource blocks of the reference measurement channel each, except for one instance that might overlap one other instance to cover the full *BS channel bandwidth*.  NOTE 2: PREFSENS is the power level of a single instance of the reference measurement channel. This requirement shall be met for each single interlace of FRC G-FR1-A1-12 and G-FR1-A1-19, except for one instance that might overlap one other instance to cover the full *BS channel bandwidth*. | | | |

**<Next of change>**

### 7.3.5 Test requirements

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel as specified in annex A.2 with parameters specified in table 7.3.2-1 for Wide Area BS, in table 7.3.2-2 for Medium Range BS and in table 7.3.2-3 for Local Area BS in any operating band except for band n46 and n96.

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel as specified in annex A.2 with parameters specified in table 7.3.5-2b for Medium Range BS and in table 7.3.5-3b for Local Area BS, for band n46.

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel as specified in annex A.2 with parameters specified in table 7.3.5-2c for Medium Range BS and in table 7.3.5-3c for Local Area BS, for band n96.

For NB-IoT operation in NR in-band, the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel as specified in Annex A of TS 36.141 [24] with parameters specified in table 7.3.5-1a for Wide Area BS, in table 7.3.5-2a for Medium Range BS and in table 7.3.5-3a for Local Area BS.

Table 7.3.5-1: Wide Area BS dynamic range

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *BS channel bandwidth* (MHz) | Subcarrier spacing (kHz) | Reference measurement channel | Wanted signal mean power (dBm) | Interfering signal mean power (dBm) / BWConfig | Type of interfering signal |
| 5 | 15 | G-FR1-A2-1 | -70.4 | -82.5 | AWGN |
|  | 30 | G-FR1-A2-2 | -71.1 |  |  |
| 10 | 15 | G-FR1-A2-1 | -70.4 | -79.3 | AWGN |
|  | 30 | G-FR1-A2-2 | -71.1 |  |  |
|  | 60 | G-FR1-A2-3 | -68.1 |  |  |
| 15 | 15 | G-FR1-A2-1 | -70.4 | -77.5 | AWGN |
|  | 30 | G-FR1-A2-2 | -71.1 |  |  |
|  | 60 | G-FR1-A2-3 | -68.1 |  |  |
| 20 | 15 | G-FR1-A2-4 | -64.2 | -76.2 | AWGN |
|  | 30 | G-FR1-A2-5 | -64.2 |  |  |
|  | 60 | G-FR1-A2-6 | -64.5 |  |  |
| 25 | 15 | G-FR1-A2-4 | -64.2 | -75.2 | AWGN |
|  | 30 | G-FR1-A2-5 | -64.2 |  |  |
|  | 60 | G-FR1-A2-6 | -64.5 |  |  |
| 30 | 15 | G-FR1-A2-4 | -64.2 | -74.4 | AWGN |
|  | 30 | G-FR1-A2-5 | -64.2 |  |  |
|  | 60 | G-FR1-A2-6 | -64.5 |  |  |
| 40 | 15 | G-FR1-A2-4 | -64.2 | -73.1 | AWGN |
|  | 30 | G-FR1-A2-5 | -64.2 |  |  |
|  | 60 | G-FR1-A2-6 | -64.5 |  |  |
| 50 | 15 | G-FR1-A2-4 | -64.2 | -72.1 | AWGN |
|  | 30 | G-FR1-A2-5 | -64.2 |  |  |
|  | 60 | G-FR1-A2-6 | -64.5 |  |  |
| 60 | 30 | G-FR1-A2-5 | -64.2 | -71.3 | AWGN |
|  | 60 | G-FR1-A2-6 | -64.5 |  |  |
| 70 | 30 | G-FR1-A2-5 | -64.2 | -70.7 | AWGN |
|  | 60 | G-FR1-A2-6 | -64.5 |  |  |
| 80 | 30 | G-FR1-A2-5 | -64.2 | -70.1 | AWGN |
|  | 60 | G-FR1-A2-6 | -64.5 |  |  |
| 90 | 30 | G-FR1-A2-5 | -64.2 | -69.5 | AWGN |
|  | 60 | G-FR1-A2-6 | -64.5 |  |  |
| 100 | 30 | G-FR1-A2-5 | -64.2 | -69.1 | AWGN |
|  | 60 | G-FR1-A2-6 | -64.5 |  |  |
| NOTE: The wanted signal mean power is the power level of a single instance of the corresponding reference measurement channel. This requirement shall be met for each consecutive application of a single instance of the reference measurement channel mapped to disjoint frequency ranges with a width corresponding to the number of resource blocks of the reference measurement channel each, except for one instance that might overlap one other instance to cover the full *BS channel bandwidth*. | | | | | |

Table 7.3.5-1a: Wide Area BS dynamic range for NB-IoT operation in NR in-band

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *BS channel bandwidth* (MHz) | Reference measurement channel | Wanted signal mean power (dBm) | Interfering signal mean power (dBm) / BWConfig | Type of interfering signal |
| 5 |  |  | -82.5 |  |
| 10 |  |  | -79.3 |  |
| 15 |  |  | -77.5 |  |
| 20 | FRC A15-1 in |  | -76.2 |  |
| 25 | Annex A.15 in | -99.4 | -75.2 | AWGN |
| 30 | TS 36.141 [24] |  | -74.4 |  |
| 40 |  |  | -73.1 |  |
| 50 |  |  | -72.1 |  |
| 5 |  |  | -82.5 |  |
| 10 |  |  | -79.3 |  |
| 15 | FRC A15-2 in |  | -77.5 |  |
| 20 | Annex A.15 in | -105.3 | -76.2 | AWGN |
| 25 | TS 36.141 [24] |  | -75.2 |  |
| 30 |  |  | -74.4 |  |
| 40 |  |  | -73.1 |  |
| 50 |  |  | -72.1 |  |

Table 7.3.5-2: Medium Range BS dynamic range

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *BS channel bandwidth* (MHz) | Subcarrier spacing (kHz) | Reference measurement channel  (Note 2) | Wanted signal mean power (dBm) | Interfering signal mean power (dBm) / BWConfig | Type of interfering signal |
| 5 | 15 | G-FR1-A2-1 | -65.4 | -77.5 | AWGN |
|  | 30 | G-FR1-A2-2 | -66.1 |  |  |
| 10 | 15 | G-FR1-A2-1 | -65.4 | -74.3 | AWGN |
|  | 30 | G-FR1-A2-2 | -66.1 |  |  |
|  | 60 | G-FR1-A2-3 | -63.1 |  |  |
| 15 | 15 | G-FR1-A2-1 | -65.4 | -72.5 | AWGN |
|  | 30 | G-FR1-A2-2 | -66.1 |  |  |
|  | 60 | G-FR1-A2-3 | -63.1 |  |  |
| 20 | 15 | G-FR1-A2-4 | -59.2 | -71.2 | AWGN |
|  | 30 | G-FR1-A2-5 | -59.2 |  |  |
|  | 60 | G-FR1-A2-6 | -59.5 |  |  |
| 25 | 15 | G-FR1-A2-4 | -59.2 | -70.2 | AWGN |
|  | 30 | G-FR1-A2-5 | -59.2 |  |  |
|  | 60 | G-FR1-A2-6 | -59.5 |  |  |
| 30 | 15 | G-FR1-A2-4 | -59.2 | -69.4 | AWGN |
|  | 30 | G-FR1-A2-5 | -59.2 |  |  |
|  | 60 | G-FR1-A2-6 | -59.5 |  |  |
| 40 | 15 | G-FR1-A2-4 | -59.2 | -68.1 | AWGN |
|  | 30 | G-FR1-A2-5 | -59.2 |  |  |
|  | 60 | G-FR1-A2-6 | -59.5 |  |  |
| 50 | 15 | G-FR1-A2-4 | -59.2 | -67.1 | AWGN |
|  | 30 | G-FR1-A2-5 | 59.8 |  |  |
|  | 60 | G-FR1-A2-6 | -59.5 |  |  |
| 60 | 30 | G-FR1-A2-5 | -59.2 | -66.3 | AWGN |
|  | 60 | G-FR1-A2-6 | -59.5 |  |  |
| 70 | 30 | G-FR1-A2-5 | -59.2 | -65.7 | AWGN |
|  | 60 | G-FR1-A2-6 | -59.5 |  |  |
| 80 | 30 | G-FR1-A2-5 | -59.2 | -65.1 | AWGN |
|  | 60 | G-FR1-A2-6 | -59.5 |  |  |
| 90 | 30 | G-FR1-A2-5 | -59.2 | -64.5 | AWGN |
|  | 60 | G-FR1-A2-6 | -59.5 |  |  |
| 100 | 30 | G-FR1-A2-5 | -59.2 | -64.1 | AWGN |
|  | 60 | G-FR1-A2-6 | -59.5 |  |  |
| NOTE 1: The wanted signal mean power is the power level of a single instance of the corresponding reference measurement channel. This requirement shall be met for each consecutive application of a single instance of the reference measurement channel mapped to disjoint frequency ranges with a width corresponding to the number of resource blocks of the reference measurement channel each, except for one instance that might overlap one other instance to cover the full *BS channel bandwidth*.  NOTE 2: These reference measurement channels are not applied for band n46 and n96. | | | | | |

Table 7.3.5-2a: Medium Range BS dynamic range for NB-IoT operation in NR in-band

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *BS channel bandwidth* (MHz) | Reference measurement channel | Wanted signal mean power (dBm) | Interfering signal mean power (dBm) / BWConfig | Type of interfering signal |
| 5 |  |  | -77.5 |  |
| 10 |  |  | -74.3 |  |
| 15 |  |  | -72.5 |  |
| 20 | FRC A15-1 in |  | -71.2 |  |
| 25 | Annex A.15 in | -94.4 | -70.2 | AWGN |
| 30 | TS 36.141 [24] |  | -69.4 |  |
| 40 |  |  | -68.1 |  |
| 50 |  |  | -67.1 |  |
| 5 |  |  | -77.5 |  |
| 10 |  |  | -74.3 |  |
| 15 | FRC A15-2 in |  | -72.5 |  |
| 20 | Annex A.15 in | -100.3 | -71.2 | AWGN |
| 25 | TS 36.141 [24] |  | -70.2 |  |
| 30 |  |  | -69.4 |  |
| 40 |  |  | -68.1 |  |
| 50 |  |  | -67.1 |  |

Table 7.3.5-2b: Medium Range BS dynamic range for band n46

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *BS channel bandwidth* (MHz) | Subcarrier spacing (kHz) | Reference measurement channel | Wanted signal mean power (dBm) | Interfering signal mean power (dBm) / BWConfig | Type of interfering signal |
| 10 | 15 | G-FR1-A2-7 | -72.5 | -74.3 | AWGN |
|  | 30 | G-FR1-A2-8 | -70.3 |  |  |
|  | 60 | G-FR1-A2-3 | -63.1 |  |  |
| 20 | 15 | G-FR1-A2-9 | -69.5 | -71.2 | AWGN |
|  | 30 | G-FR1-A2-10 | -66.5 |  |  |
|  | 60 | G-FR1-A2-6 | -59.5 |  |  |
| 40 | 15 | G-FR1-A2-11 | -66.4 | -68.1 | AWGN |
|  | 30 | G-FR1-A2-12 | -63.4 |  |  |
|  | 60 | G-FR1-A2-6 | -59.5 |  |  |
| 60 | 30 | G-FR1-A2-13 | -61.6 | -66.3 | AWGN |
|  | 60 | G-FR1-A2-6 | -59.5 |  |  |
| 80 | 30 | G-FR1-A2-14 | -60.4 | -65.1 | AWGN |
|  | 60 | G-FR1-A2-6 | -59.5 |  |  |
| NOTE: The wanted signal mean power is the power level of a single instance of the corresponding reference measurement channel. This requirement shall be met for each consecutive application of a single instance of the reference measurement channel mapped to disjoint frequency ranges with a width corresponding to the number of resource blocks of the reference measurement channel each, except for one instance that might overlap one other instance to cover the full *BS channel bandwidth*. | | | | | |

**Table 7.3.5-2c: Medium Range BS dynamic range for band n96**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***BS channel bandwidth* (MHz)** | **Subcarrier spacing (kHz)** | **Reference measurement channel** | **Wanted signal mean power (dBm)** | **Interfering signal mean power (dBm) / BWConfig** | **Type of interfering signal** |
| 20 | 15 | G-FR1-A2-9 | -68.5 | -70.2 | AWGN |
|  | 30 | G-FR1-A2-10 | -65.5 |  |  |
|  | 60 | G-FR1-A2-6 | -58.5 |  |  |
| 40 | 15 | G-FR1-A2-11 | -65.4 | -67.1 | AWGN |
|  | 30 | G-FR1-A2-12 | -62.4 |  |  |
|  | 60 | G-FR1-A2-6 | -58.5 |  |  |
| 60 | 30 | G-FR1-A2-13 | -60.6 | -65.3 | AWGN |
|  | 60 | G-FR1-A2-6 | -58.5 |  |  |
| 80 | 30 | G-FR1-A2-14 | -59.4 | -64.1 | AWGN |
|  | 60 | G-FR1-A2-6 | -58.5 |  |  |
| NOTE: The wanted signal mean power is the power level of a single instance of the corresponding reference measurement channel. This requirement shall be met for each consecutive application of a single instance of the reference measurement channel mapped to disjoint frequency ranges with a width corresponding to the number of resource blocks of the reference measurement channel each, except for one instance that might overlap one other instance to cover the full *BS channel bandwidth*. | | | | | |

Table 7.3.5-3: Local Area BS dynamic range

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *BS channel bandwidth* (MHz) | Subcarrier spacing (kHz) | Reference measurement channel  (Note 2) | Wanted signal mean power (dBm) | Interfering signal mean power (dBm) / BWConfig | Type of interfering signal |
| 5 | 15 | G-FR1-A2-1 | -62.4 | -74.5 | AWGN |
|  | 30 | G-FR1-A2-2 | -63.1 |  |  |
| 10 | 15 | G-FR1-A2-1 | -62.4 | -71.3 | AWGN |
|  | 30 | G-FR1-A2-2 | -63.1 |  |  |
|  | 60 | G-FR1-A2-3 | -60.1 |  |  |
| 15 | 15 | G-FR1-A2-1 | -62.4 | -69.5 | AWGN |
|  | 30 | G-FR1-A2-2 | -63.1 |  |  |
|  | 60 | G-FR1-A2-3 | -60.1 |  |  |
| 20 | 15 | G-FR1-A2-4 | -56.2 | -68.2 | AWGN |
|  | 30 | G-FR1-A2-5 | -56.2 |  |  |
|  | 60 | G-FR1-A2-6 | -56.5 |  |  |
| 25 | 15 | G-FR1-A2-4 | -56.2 | -67.2 | AWGN |
|  | 30 | G-FR1-A2-5 | -56.2 |  |  |
|  | 60 | G-FR1-A2-6 | -56.5 |  |  |
| 30 | 15 | G-FR1-A2-4 | -56.2 | -66.4 | AWGN |
|  | 30 | G-FR1-A2-5 | -56.2 |  |  |
|  | 60 | G-FR1-A2-6 | -56.5 |  |  |
| 40 | 15 | G-FR1-A2-4 | -56.2 | -65.1 | AWGN |
|  | 30 | G-FR1-A2-5 | -56.2 |  |  |
|  | 60 | G-FR1-A2-6 | -56.5 |  |  |
| 50 | 15 | G-FR1-A2-4 | -56.2 | -64.1 | AWGN |
|  | 30 | G-FR1-A2-5 | -56.2 |  |  |
|  | 60 | G-FR1-A2-6 | -56.5 |  |  |
| 60 | 30 | G-FR1-A2-5 | -56.2 | -63.3 | AWGN |
|  | 60 | G-FR1-A2-6 | -56.5 |  |  |
| 70 | 30 | G-FR1-A2-5 | -56.2 | -62.7 | AWGN |
|  | 60 | G-FR1-A2-6 | -56.5 |  |  |
| 80 | 30 | G-FR1-A2-5 | -56.2 | -62.1 | AWGN |
|  | 60 | G-FR1-A2-6 | -56.5 |  |  |
| 90 | 30 | G-FR1-A2-5 | -56.2 | -61.5 | AWGN |
|  | 60 | G-FR1-A2-6 | -56.5 |  |  |
| 100 | 30 | G-FR1-A2-5 | -56.2 | -61.1 | AWGN |
|  | 60 | G-FR1-A2-6 | -56.5 |  |  |
| NOTE 1: The wanted signal mean power is the power level of a single instance of the corresponding reference measurement channel. This requirement shall be met for each consecutive application of a single instance of the reference measurement channel mapped to disjoint frequency ranges with a width corresponding to the number of resource blocks of the reference measurement channel each, except for one instance that might overlap one other instance to cover the full *BS channel bandwidth*.  NOTE 2: These reference measurement channels are not applied for band n46 and n96. | | | | | |

Table 7.3.5-3a: Local Area BS dynamic range for NB-IoT operation in NR in-band

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *BS channel bandwidth* (MHz) | Reference measurement channel | Wanted signal mean power (dBm) | Interfering signal mean power (dBm) / BWConfig | Type of interfering signal |
| 5 |  |  | -74.5 |  |
| 10 |  |  | -71.3 |  |
| 15 | FRC A15-1 in |  | -69.5 |  |
| 20 | Annex A.15 in | -91.4 | -68.2 | AWGN |
| 25 | TS 36.141 [24] |  | -67.2 |  |
| 30 |  |  | -66.4 |  |
| 40 |  |  | -65.1 |  |
| 50 |  |  | -64.1 |  |
| 5 |  |  | -74.5 |  |
| 10 |  |  | -71.3 |  |
| 15 | FRC A15-2 in |  | -69.5 |  |
| 20 | Annex A.15 in | -97.3 | -68.2 | AWGN |
| 25 | TS 36.141 [24] |  | -67.2 |  |
| 30 |  |  | -66.4 |  |
| 40 |  |  | -65.1 |  |
| 50 |  |  | -64.1 |  |

Table 7.3.5-3b: Local Area BS dynamic range for band n46

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *BS channel bandwidth* (MHz) | Subcarrier spacing (kHz) | Reference measurement channel | Wanted signal mean power (dBm) | Interfering signal mean power (dBm) / BWConfig | Type of interfering signal |
| 10 | 15 | G-FR1-A2-7 | -69.5 | -71.3 | AWGN |
|  | 30 | G-FR1-A2-8 | -67.3 |  |  |
|  | 60 | G-FR1-A2-3 | -60.1 |  |  |
| 20 | 15 | G-FR1-A2-9 | -66.5 | -68.2 | AWGN |
|  | 30 | G-FR1-A2-19 | -63.5 |  |  |
|  | 60 | G-FR1-A2-6 | -56.5 |  |  |
| 40 | 15 | G-FR1-A2-11 | -63.4 | -65.1 | AWGN |
|  | 30 | G-FR1-A2-12 | -60.4 |  |  |
|  | 60 | G-FR1-A2-6 | -56.5 |  |  |
| 60 | 30 | G-FR1-A2-13 | -58.6 | -63.3 | AWGN |
|  | 60 | G-FR1-A2-6 | -56.5 |  |  |
| 80 | 30 | G-FR1-A2-14 | -57.4 | -62.1 | AWGN |
|  | 60 | G-FR1-A2-6 | -56.5 |  |  |
| NOTE: The wanted signal mean power is the power level of a single instance of the corresponding reference measurement channel. This requirement shall be met for each interleaved application of a single instance of the reference measurement channel mapped to disjoint frequency ranges with a width corresponding to the number of resource blocks of the reference measurement channel each. | | | | | |

Table 7.3.5-3c: Local area BS dynamic range for band n96

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *BS channel bandwidth* (MHz) | Subcarrier spacing (kHz) | Reference measurement channel | Wanted signal mean power (dBm) | Interfering signal mean power (dBm) / BWConfig | Type of interfering signal |
| 20 | 15 | G-FR1-A2-9 | -65.5 | -67.2 | AWGN |
|  | 30 | G-FR1-A2-19 | -62.5 |  |  |
|  | 60 | G-FR1-A2-6 | -55.5 |  |  |
| 40 | 15 | G-FR1-A2-11 | -62.4 | -64.1 | AWGN |
|  | 30 | G-FR1-A2-12 | -59.4 |  |  |
|  | 60 | G-FR1-A2-6 | -55.5 |  |  |
| 60 | 30 | G-FR1-A2-13 | -57.6 | -62.3 | AWGN |
|  | 60 | G-FR1-A2-6 | -55.5 |  |  |
| 80 | 30 | G-FR1-A2-14 | -56.4 | -61.1 | AWGN |
|  | 60 | G-FR1-A2-6 | -55.5 |  |  |
| NOTE: The wanted signal mean power is the power level of a single instance of the corresponding reference measurement channel. This requirement shall be met for each interleaved application of a single instance of the reference measurement channel mapped to disjoint frequency ranges with a width corresponding to the number of resource blocks of the reference measurement channel each. | | | | | |

**<Next of change>**

#### 7.4.1.5 Test requirements

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel.

For BS, the wanted and the interfering signal coupled to the *BS* *type 1-C* *antenna connector* or *BS type 1-H* *TAB connector* are specified in table 7.4.1.5-1 and the frequency offset between the wanted and interfering signal in table 7.4.1.5-2 for ACS. The reference measurement channel for the wanted signal is identified in table 7.2.5-1, 7.2.5-2 and 7.2.5-3 for each channel bandwidth in any operating band except for band n46 and n96 and further specified in annex A.1. The characteristics of the interfering signal is further specified in annex E.

For BS operating in band n46 and n96, the wanted and the interfering signal coupled to the BS type 1-C antenna connector or BS type 1-H TAB connector are specified in table 7.4.1.5-1a,7.4.1.5-1b and the frequency offset between the wanted and interfering signal in table 7.4.1.5-2a for ACS. The reference measurement channel for the wanted signal is identified in table 7.2.5-2a,7.2.5-3a and 7.2.5-3b for each BS channel bandwidth and further specified in annex A.1a. The characteristics of the interfering signal is further specified in annex D.

For BS supporting NB-IoT operation in NR in-band, the wanted and the interfering signal coupled to the *BS* *type 1-C* *antenna connector* are specified in table 7.4.1.5-1 and the frequency offset between the wanted and interfering signal in table 7.4.1.5-2 for ACS. The reference measurement channel for the NB-IoT wanted signal is identified in clause 7.2.5 of TS 36.141 [24]. The characteristics of the interfering signal is further specified in annex E.

The ACS requirement is applicable outside the Base Station RF Bandwidth or Radio Bandwidth. The interfering signal offset is defined relative to the Base station RF Bandwidth edges or Radio Bandwidth edges.

For a BS operating in non-contiguous spectrum within any *operating band*, the ACS requirement shall apply in addition inside any sub-block gap, in case the sub-block gap size is at least as wide as the NR interfering signal in table 7.4.1.5-2. The interfering signal offset is defined relative to the sub-block edges inside the sub-block gap.

For a *multi-band connector*, the ACS requirement shall apply in addition inside any Inter RF Bandwidth gap, in case the Inter RF Bandwidth gap size is at least as wide as the NR interfering signal in table 7.4.1.5‑2. The interfering signal offset is defined relative to the Base Station RF Bandwidth edges inside the Inter RF Bandwidth gap

Conducted requirement is defined at the *antenna connector* for *BS type 1-C* and at the *TAB connector* for *BS type 1-H.*

Table 7.4.1.5-1: Base station ACS requirement

|  |  |  |
| --- | --- | --- |
| *BS channel bandwidth* of the lowest/highest carrier received (MHz) | Wanted signal mean power (dBm) | Interfering signal mean power (dBm) |
| 5, 10, 15, 20,  25, 30, 40, 50, 60, 70, 80, 90, 100  (Note 1) | PREFSENS + 6 dB | Wide Area BS: -52  Medium Range BS: -47  Local Area BS: -44 |
| NOTE 1: The SCS for the lowest/highest carrier received is the lowest SCS supported by the BS for that bandwidth.  NOTE 2: PREFSENS depends on the RAT. For NR, PREFSENS depends also on the *BS channel bandwidth* as specified in TS 38.104 [2], table 7.2.2-1, 7.2.2-2 and 7.2.2-3. For NB-IoT, PREFSENS depends also on the *sub-carrier spacing* as specified in tables 7.2-5, 7.2-6 and 7.2-8 of TS 36.141 [24]. | | |

Table 7.4.1.5-1a: Base station ACS requirement for band n46 and n96

|  |  |  |
| --- | --- | --- |
| *BS channel bandwidth* of the lowest/*highest carrier* received (MHz) | Wanted signal mean power (dBm) | Interfering signal mean power (dBm) |
| 10, 20, 40, 60, 80 (Note 1) | PREFSENS + 6 dB | Medium Range BS: -47  Local Area BS: -44 |
| NOTE 1: The SCS for the lowest/highest carrier received is the lowest SCS supported by the BS for that bandwidth.  NOTE 2: PREFSENS depends on the RAT. For NR, PREFSENS depends also on the *BS channel bandwidth* as specified in tables 7.2.5-2a, 7.2.5-2b,7.2.5-3a and 7.2.5-3b. | | |

Table 7.4.1.5-2: Base Station ACS interferer frequency offset values

|  |  |  |
| --- | --- | --- |
| *BS channel bandwidth* of the lowest/highest carrier received (MHz) | Interfering signal centre frequency offset from the lower/upper Base Station RF Bandwidth edge or sub-block edge inside a sub-block gap (MHz) | Type of interfering signal |
| 5 | ±2.5025 |  |
| 10 | ±2.5075 | 5 MHz DFT-s-OFDM NR signal, |
| 15 | ±2.5125 | 15 kHz SCS, 25 RBs |
| 20 | ±2.5025 |  |
| 25 | ±9.4675 |  |
| 30 | ±9.4725 |  |
| 40 | ±9.4675 |  |
| 50 | ±9.4625 | 20 MHz DFT-s-OFDM NR |
| 60 | ±9.4725 | signal, 15 kHz SCS, 100 RBs |
| 70 | ±9.4675 |  |
| 80 | ±9.4625 |  |
| 90 | ±9.4725 |  |
| 100 | ±9.4675 |  |

Table 7.4.1.5-2a: Base Station ACS interferer frequency offset values for band n46 and n96

|  |  |  |
| --- | --- | --- |
| *BS channel bandwidth* of the *lowest/highest carrier* received (MHz) | Interfering signal centre frequency offset from the lower/upper *Base Station RF Bandwidth edge* or *sub-block* edge inside a *sub-block gap* (MHz) | Type of interfering signal |
| 10 | ±9.4675 |  |
| 20 | ±9.4625 | 20 MHz DFT-s-OFDM NR signal |
| 40 | ±9.4675 | 15 kHz SCS, 100 RBs |
| 60 | ±9.4725 |  |
| 80 | ±9.4625 |  |

**<Next of change>**

#### 7.4.2.5 Test requirements

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel, with a wanted and an interfering signal coupled to *BS type 1-C* *antenna connector* or *BS type 1‑H* *TAB connector* using the parameters in tables 7.4.2.5-1, 7.4.2.5-2 and 7.4.2.5-3 for general blocking and narrowband blocking requirements. Narrowband blocking requirements are not applied for band n46 and n96. The reference measurement channel for the wanted signal is identified in clause 7.2.5 for each channel bandwidth and further specified in annex A.1. The characteristics of the interfering signal is further specified in annex E.

For NB-IoT operation in NR in-band, the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel, with a wanted and an interfering signal coupled to *BS type 1-C* *antenna connector* using the parameters in tables 7.4.2.5-1, 7.4.2.5-2a and 7.4.2.5-3 for general blocking and narrowband blocking requirements. The reference measurement channel for the NB-IoT wanted signal is identified in clause 7.2.5 of TS 36.141 [24]. The characteristics of the interfering signal is further specified in annex E.

The in-band blocking requirements apply outside the Base Station RF Bandwidth or Radio Bandwidth. The interfering signal offset is defined relative to the Base Station RF Bandwidth edges or Radio Bandwidth edges.

For *BS type 1-C* and *BS type 1-H,* the in-band blocking requirement applies from FUL\_low - ΔfOOB to FUL\_high + ΔfOOB, excluding the downlink frequency range of the *operating band*. The ΔfOOB for *BS type 1-C* and *BS type 1-H* is defined in table 7.4.2.5-0.

Minimum conducted requirement is defined at the *antenna connector* for *BS type 1-C* and at the *TAB connector* for *BS type 1-H.*

Table 7.4.2.5-0: ΔfOOB offset for NR *operating bands*

|  |  |  |
| --- | --- | --- |
| BS type | *Operating band* characteristics | ΔfOOB (MHz) |
| *BS type 1-C* | FUL\_high – FUL\_low ≤ 200 MHz | 20 |
|  | 200 MHz < FUL\_high – FUL\_low ≤ 900 MHz | 60 |
| *BS type 1-H* | FUL\_high – FUL\_low < 100 MHz | 20 |
|  | 100 MHz ≤ FUL\_high – FUL\_low ≤ 900 MHz | 60 |
|  | 100 MHz ≤ FUL\_high – FUL\_low ≤ 900 MHz | 60 |

For band n46 and n96, ΔfOOB for *BS type 1-C* and *BS type 1-H* is defined in table 7.4.2.5-0a.

Table 7.4.2.5-0a: ΔfOOB offset for NR *operating bands*

|  |  |
| --- | --- |
| ***Operating band*** | **ΔfOOB (MHz)** |
| n46 | 60 |
| n96 | 70 |

For a BS operating in non-contiguous spectrum within any *operating band*, the in-band blocking requirements apply in addition inside any sub-block gap, in case the sub-block gap size is at least as wide as twice the interfering signal minimum offset in table 7.4.2.5-1. The interfering signal offset is defined relative to the sub-block edges inside the sub-block gap.

For a *multi-band connector*, the blocking requirements apply in the in-band blocking frequency ranges for each supported *operating band*. The requirement applies in addition inside any Inter RF Bandwidth gap, in case the Inter RF Bandwidth gap size is at least as wide as twice the interfering signal minimum offset in table 7.4.2.5-1.

For a BS operating in non-contiguous spectrum within any operating band, the narrowband blocking requirement applies in addition inside any sub-block gap, in case the sub-block gap size is at least as wide as the channel bandwidth of the NR interfering signal in table 7.4.2.5-3. The interfering signal offset is defined relative to the sub-block edges inside the sub-block gap.

For a *multi-band connector*, the narrowband blocking requirement applies in addition inside any Inter RF Bandwidth gap, in case the Inter RF Bandwidth gap size is at least as wide as the NR interfering signal in table 7.4.2.5-3. The interfering signal offset is defined relative to the Base Station RF Bandwidth edges inside the Inter RF Bandwidth gap.

Table 7.4.2.5-1: Base station general blocking requirement

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *BS channel bandwidth* of the lowest/highest carrier received (MHz) | Wanted signal mean power (dBm) | Interfering signal mean power (dBm) | Interfering signal centre frequency minimum offset from the lower/upper Base Station RF Bandwidth edge or sub-block edge inside a sub-block gap (MHz) | Type of interfering signal |
| 5, 10, 15, 20 | PREFSENS + 6 dB | Wide Area BS: -43  Medium Range BS: -38  Local Area BS: -35 | ±7.5 | 5 MHz DFT-s-OFDM NR signal, 15 kHz SCS, 25 RBs |
| 25, 30, 40, 50, 60, 70, 80, 90, 100 | PREFSENS + 6 dB | Wide Area BS: -43  Medium Range BS: -38  Local Area BS: -35 | ±30 | 20 MHz DFT-s-OFDM NR signal, 15 kHz SCS, 100 RBs |
| NOTE: PREFSENS depends on the RAT. For NR, PREFSENS depends also on the *BS channel bandwidth* as specified in TS 38.104 [2], table 7.2.2-1, 7.2.2-2 and 7.2.2-3. For NB-IoT, PREFSENS depends also on the *sub-carrier spacing* as specified in tables 7.2-5, 7.2-6 and 7.2-8 of TS 36.141 [24]. | | | | |

Table 7.4.2.5-1a: Base station general blocking requirement for n46

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| BS channel bandwidth of the lowest/highest carrier received (MHz) | Wanted signal mean power (dBm) | Interfering signal mean power (dBm) | Interfering signal centre frequency minimum offset from the lower/upper Base Station RF Bandwidth edge or sub-block edge inside a sub-block gap (MHz) | Type of interfering signal |
| 10, 20, 40, 60, 80 | PREFSENS + 6 dB | Medium Range BS: -38  Local Area BS: -35 | ±30 | 20 MHz DFT-s-OFDM NR signal  15 kHz SCS, 100 RBs |
| NOTE: PREFSENS depends on the RAT. For NR, PREFSENS depends also on the *BS channel bandwidth* as specified in tables 7.2.5-2a, 7.2.5-3a. | | | | |

Table 7.4.2.5-1b: Base station general blocking requirement for n96

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| BS channel bandwidth of the lowest/highest carrier received (MHz) | Wanted signal mean power (dBm) | Interfering signal mean power (dBm) | Interfering signal centre frequency minimum offset from the lower/upper Base Station RF Bandwidth edge or sub-block edge inside a sub-block gap (MHz) | Type of interfering signal |
| 20, 40, 60, 80 | PREFSENS + 6 dB | Medium Range BS: -38  Local Area BS: -35 | ±30 | 20 MHz DFT-s-OFDM NR signal  15 kHz SCS, 100 RBs |
| NOTE: PREFSENS depends on the RAT. For NR, PREFSENS depends also on the *BS channel bandwidth* as specified in tables 7.2.5-2b, 7.2.5-3b. | | | | |

Table 7.4.2.5-2: Base station narrowband blocking requirement

|  |  |  |
| --- | --- | --- |
| *BS channel bandwidth* of the lowest/highest carrier received (MHz) | Wanted signal mean power (dBm) | Interfering signal mean power (dBm) |
| 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100  (Note 1) | PREFSENS + 6 dB | Wide Area BS: -49  Medium Range BS: -44  Local Area BS: -41 |
| NOTE 1: The SCS for the lowest/highest carrier received is the lowest SCS supported by the BS for that *BS channel bandwidth*  NOTE 2: PREFSENS depends on the *BS channel bandwidth* as specified in TS 38.104 [2], table 7.2.2-1, 7.2.2-2 and 7.2.2-3.  NOTE 3: 7.5 kHz shift is not applied to the wanted signal. | | |

Table 7.4.2.5-2a: Base Station narrowband blocking requirement for NB-IoT operation in NR in-band

|  |  |  |
| --- | --- | --- |
| *BS channel bandwidth* (MHz) | Wanted signal mean power (dBm) | Interfering signal mean power (dBm) |
| 5, 10, 15, 20, 25, 30, 40, 50 | PREFSENS + x dB (Note 2) | Wide Area: -49  Medium Range: -44  Local Area: -41 |
| NOTE 1: PREFSENS depends on the *sub-carrier spacing* as specified in tables 7.2-5, 7.2-6 and 7.2-8 of TS 36.141 [24].  NOTE 2: "x" is equal to 8 in case of 5 MHz channel bandwidth and equal to 6 otherwise. | | |

Table 7.4.2.5-3: Base station narrowband blocking interferer frequency offsets

|  |  |  |
| --- | --- | --- |
| *BS channel bandwidth* of the lowest/highest carrier received (MHz) | Interfering RB centre frequency offset to the lower/upper Base Station RF Bandwidth edge or sub-block edge inside a sub-block gap (kHz)  (Note 2) | Type of interfering signal |
| 5 | ±(350+m\*180),  m=0, 1, 2, 3, 4, 9, 14, 19, 24 | 5 MHz DFT-s-OFDM NR signal, 15 kHz SCS, 1 RB |
| 10 | ±(355+m\*180),  m=0, 1, 2, 3, 4, 9, 14, 19, 24 |  |
| 15 | ±(360+m\*180),  m=0, 1, 2, 3, 4, 9, 14, 19, 24 |  |
| 20 | ±(350+m\*180),  m=0, 1, 2, 3, 4, 9, 14, 19, 24 |  |
| 25 | ±(565+m\*180),  m=0, 1, 2, 3, 4, 29, 54, 79, 99 | 20 MHz DFT-s-OFDM NR signal, 15 kHz SCS, 1 RB |
| 30 | ±(570+m\*180),  m=0, 1, 2, 3, 4, 29, 54, 79, 99 |  |
| 40 | ±(565+m\*180),  m=0, 1, 2, 3, 4, 29, 54, 79, 99 |  |
| 50 | ±(560+m\*180),  m=0, 1, 2, 3, 4, 29, 54, 79, 99 |  |
| 60 | ±(570+m\*180),  m=0, 1, 2, 3, 4, 29, 54, 79, 99 |  |
| 70 | ±(565+m\*180),  m=0, 1, 2, 3, 4, 29, 54, 79, 99 |  |
| 80 | ±(560+m\*180),  m=0, 1, 2, 3, 4, 29, 54, 79, 99 |  |
| 90 | ±(570+m\*180),  m=0, 1, 2, 3, 4, 29, 54, 79, 99 |  |
| 100 | ±(565+m\*180),  m=0, 1, 2, 3, 4, 29, 54, 79, 99 |  |
| NOTE 1: Interfering signal consisting of one resource block positioned at the stated offset, the *channel bandwidth* of the interfering signal is located adjacently to the lower/upper Base Station RF Bandwidth edge or sub-block edge inside a sub-block gap.  NOTE 2: The centre of the interfering RB refers to the frequency location between the two central subcarriers. | | |

**<Next of change>**

### 7.5.5 Test requirements

#### 7.5.5.1 General requirements

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel, with a wanted and an interfering signal coupled to *BS type 1-C* *antenna connector* or *BS type 1-H* *TAB connector* using the parameters in table 7.5.5.1-1. The reference measurement channel for the wanted signal is identified in clause 7.2.2 for each channel bandwidth and further specified in annex A.1.

For NB-IoT operation in NR in-band, the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel, with a wanted and an interfering signal coupled to *BS type 1-C* *antenna connector* using the parameters in table 7.5.5.1-1. The reference measurement channel for the NB-IoT wanted signal is identified in clause 7.2.5 of TS 36.141 [24]. The characteristics of the interfering signal is further specified in annex E.

For *BS type 1-C* and *BS type 1-H* the out-of-band blocking requirement apply from 1 MHz to FUL\_low - ΔfOOB and from FUL\_high + ΔfOOB up to 12750 MHz, including the downlink frequency range of the FDD *operating band* for BS supporting FDD. The ΔfOOB for or *BS type 1-C* and *BS type 1-H* is defined in table 7.4.2.5-0.

Minimum conducted requirement is defined at the *antenna connector* for *BS type 1-C* and at the *TAB connector* for *BS type 1-H.*

For a BS capable of multi-band operation, the requirement in the out-of-band blocking frequency ranges apply for each *operating band*, with the exception that the in-band blocking frequency ranges of all supported *operating bands* according to clause 7.4.2.5 shall be excluded from the out-of-band blocking requirement.

Table 7.5.5.1-1: Out-of-band blocking performance requirement

|  |  |  |
| --- | --- | --- |
| Wanted signal mean power (dBm) | Interfering signal mean power (dBm) | Type of interfering signal |
| PREFSENS +6 dB (Note 1) | -15 | CW carrier |
| NOTE 1: PREFSENS depends on the RAT. For NR, PREFSENS depends also on the *BS channel bandwidth* as specified in TS 38.104 [2], table 7.2.2-1, 7.2.2-2 and 7.2.2-3. For NB-IoT, PREFSENS depends also on the *sub-carrier spacing* as specified in tables 7.2-5, 7.2-6 and 7.2-8 of TS 36.141 [24].  NOTE 2: For NB-IoT, up to 24 exceptions are allowed for spurious response frequencies in each wanted signal frequency when measured using a 1MHz step size. For these exceptions the above throughput requirement shall be met when the blocking signal is set to a level of -40 dBm for 15 kHz subcarrier spacing and -46 dBm for 3.75 kHz subcarrier spacing. In addition, each group of exceptions shall not exceed three contiguous measurements using a 1MHz step size. | | |

**Table 7.5.5.1-1a: Out-of-band blocking performance requirement for NR band n46, n96**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Operating Band** | **Centre Frequency of Interfering Signal [MHz]** | | | **Wanted Signal mean power (dBm)** | **Interfering Signal mean power (dBm)** | **Type of Interfering Signal** |
| n46, n96 | (FUL\_low -500)  (FUL\_high +ΔfOOB) | to  to | (FUL\_low -ΔfOOB)  (FUL\_high +500) | PREFSENS +6dB | -35 | CW carrier |
| 1  (FUL\_high +500) | to  to | (FUL\_low -500)  12750 | PREFSENS +6dB | -15 | CW carrier |
| NOTE 1: PREFSENS depends on the *BS channel bandwidth* as specified in tables 7.2.5-2a, 7.2.5-2b, 7.2.5-3a and 7.2.5-3b. | | | | | | |

#### 7.5.5.2 Co-location requirements

This additional blocking requirement may be applied for the protection of NR BS receivers when GSM, CDMA, UTRA, E-UTRA BS or NR BS operating in a different frequency band are co-located with a NR BS. The requirement is applicable to all channel bandwidths supported by the NR BS.

The requirements in this clause assume a 30 dB coupling loss between interfering transmitter and NR BS receiver and are based on co-location with base stations of the same class.

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel, with a wanted and an interfering signal coupled to BS antenna input using the parameters in table 7.5.5.2-1 for all the BS classes. The reference measurement channel for the wanted signal is identified in tables 7.2.5-1, 7.2.5-2 and 7.2.5-3 for each channel bandwidth and further specified in annex A.1.

For *BS type 1-C* and *BS type 1-H* blocking requirement for co-location with BS in other bands is applied for all operating bands for which co-location protection is provided.

Minimum conducted requirement is defined at the *antenna connector* for *BS type 1-C* and at the *TAB connector* for *BS type 1-H.*

Table 7.5.5.2-1: Blocking performance requirement for NR BS when co-located with BS in other frequency bands.

| Frequency range of interfering signal | Wanted signal mean power for WA BS (dBm) | Interfering signal mean power for WA BS (dBm) | Interfering signal mean power for MR BS (dBm) | Interfering signal mean power for LA BS (dBm) | Type of interfering signal |
| --- | --- | --- | --- | --- | --- |
| Frequency range of co-located downlink operating band | PREFSENS +6dB (Note 1) | +16 | +8 | x (Note 2) | CW carrier |
| NOTE 1: PREFSENS depends on the *BS channel bandwidth* as specified in TS 38.104 [2], table 7.2.2-1, 7.2.2-2 and 7.2.2-3.  NOTE 2: x = -7 dBm for NR BS co-located with Pico GSM850 or Pico CDMA850 x = -4 dBm for NR BS co-located with Pico DCS1800 or Pico PCS1900 x = -6 dBm for NR BS co-located with UTRA bands or E-UTRA bands or NR bands  NOTE 3: The requirement does not apply when the interfering signal falls within any of the supported uplink operating band(s) or in ΔfOOB immediately outside any of the supported uplink operating band(s).  NOTE 4: For unsynchronized base stations (except in band n46 and n96), special co-location requirements may apply that are not covered by the 3GPP specifications | | | | | |

**<Next of change>**

### 7.6.5 Test requirements

#### 7.6.5.1 Basic limits

The receiver spurious emissions limits are provided in table 7.6.5.1-1.

Table 7.6.5.1-1: General BS receiver spurious emissions limits

| Spurious frequency range | *Basic limit* | Measurement bandwidth | Notes |
| --- | --- | --- | --- |
| 30 MHz – 1 GHz | -57 dBm | 100 kHz | Note 1 |
| 1 GHz – 12.75 GHz | -47 dBm | 1 MHz | Note 1, Note 2 |
| 12.75 GHz – 5th harmonic of the upper frequency edge of the UL *operating band* in GHz | -47 dBm | 1 MHz | Note 1, Note 2, Note 3 |
| 12.75 GHz ‑ 26 GHz | -47 dBm | 1 MHz | Note 1, Note 2, Note 6 |
| NOTE 1: Measurement bandwidths as in ITU-R SM.329 [5], s4.1.  NOTE 2: Upper frequency as in ITU-R SM.329 [5], s2.5 table 1.  NOTE 3: This spurious frequency range applies only for *operating bands* for which the 5th harmonic of the upper frequency edge of the UL *operating band* is reaching beyond 12.75 GHz.  NOTE 4: The frequency range from ΔfOBUE below the lowest frequency of the BS transmitter operating band to ΔfOBUE above the highest frequency of the BS transmitter *operating band* may be excluded from the requirement. ΔfOBUE is defined in clause 6.6.1. For *multi-band* *connectors*, the exclusion applies for all supported *operating bands*.  NOTE 5: Void  NOTE 6: Applies only for band n46 and n96. | | | |

**<Next of change>**

### 7.7.5 Test requirements

The throughputshall be ≥ 95% of the maximum throughput of the reference measurement channel, with a wanted signal at the assigned channel frequency and two interfering signals coupled to the *BS type 1-C antenna connector* or *BS type 1-H* *TAB connector*, with the conditions specified in tables 7.7.5-1 and 7.7.5-2 for intermodulation performance in any operating band except for band n46 and n96, and 7.7.5-1a for band n46 and n96 and in tables 7.7.5-3, and 7.7.5-4 for narrowband intermodulation performance. Narrowband intermodulation requirements are not applied for band n46 and n96. The reference measurement channel for the wanted signal is identified in tables 7.2.5-1 to 7.2.5-3 for each channel bandwidth and further specified in annex A.1. The characteristics of the interfering signal is further specified in annex E.

For NB-IoT operation in NR in-band, the throughputshall be ≥ 95% of the maximum throughput of the reference measurement channel, with a wanted signal at the assigned channel frequency and two interfering signals coupled to the *BS type 1-C antenna connector*, with the conditions specified in tables 7.7.5-1 and 7.7.5-2 for intermodulation performance and in tables 7.7.5-3, and 7.7.5-4 for narrowband intermodulation performance. The reference measurement channel for the NB-IoT wanted signal is identified in clause 7.2.5 of TS 36.141 [24]. The characteristics of the interfering signal is further specified in annex E.

The subcarrier spacing for the modulated interfering signal shall in general be the same as the subcarrier spacing for the wanted signal, except for the case of wanted signal subcarrier spacing 60 kHz and BS channel bandwidth <=20MHz, for which the subcarrier spacing of the interfering signal should be 30 kHz.

The receiver intermodulation requirement is applicable outside the Base Station RF Bandwidth or Radio Bandwidth edges. The interfering signal offset is defined relative to the Base Station RF Bandwidth edges or Radio Bandwidth edges.

For a BS operating in non-contiguous spectrum within any *operating band*, the narrowband intermodulation requirement applies in addition inside any sub-block gap in case the sub-block gap is at least as wide as the channel bandwidth of the NR interfering signal in table 7.7.5-2 or 7.7.5-4. The interfering signal offset is defined relative to the sub-block edges inside the sub-block gap.

For a *multi-band connectors*, the intermodulation requirement applies in addition inside any Inter RF Bandwidth gap, in case the gap size is at least twice as wide as the NR interfering signal centre frequency offset from the Base Station RF Bandwidth edge.

For a *multi-band connectors*, the narrowband intermodulation requirement applies in addition inside any Inter RF Bandwidth gap in case the gap size is at least as wide as the NR interfering signal in tables 7.7.5-2 and 7.7.5-4. The interfering signal offset is defined relative to the Base Station RF Bandwidth edges inside the Inter RF Bandwidth gap.

Table 7.7.5-1: General intermodulation requirement

|  |  |  |  |
| --- | --- | --- | --- |
| Base Station type | Wanted Signal mean power (dBm) | Mean power of interfering signals (dBm) | Type of interfering signals |
| Wide Area BS | PREFSENS + 6 dB | -52 |  |
| Medium Range BS | PREFSENS + 6 dB | -47 | See table 7.7.5-2 |
| Local Area BS | PREFSENS + 6 dB | -44 |  |
| NOTE: PREFSENS depends on the RAT and the BS class. For NR, PREFSENS depends also on the *BS channel bandwidth* as specified inTS 38.104 [2], table 7.2.2-1, 7.2.2-2 and 7.2.2-3. For NB-IoT, PREFSENS depends also on the *sub-carrier spacing* as specified in tables 7.2-5, 7.2-6 and 7.2-8 of TS 36.141 [24]. | | | |

Table 7.7.5-1a: General intermodulation requirement for band n46 and n96

| Base Station Type | Wanted Signal mean power (dBm) | Mean power of interfering signals (dBm) | Type of interfering signals |
| --- | --- | --- | --- |
| Medium Range BS | PREFSENS +6 dB | -47 | See Table 7.7.5-2a |
| Local Area BS | PREFSENS +6 dB | -44 |  |
| NOTE: PREFSENS depends on the RAT and the BS class. For NR, PREFSENS depends also on the *BS channel bandwidth*, see clause 7.2.5. | | | |

Table 7.7.5-2: Interfering signals for intermodulation requirement

|  |  |  |
| --- | --- | --- |
| *BS channel bandwidth* of the lowest/highest carrier received (MHz) | Interfering signal centre frequency offset from the lower/upper Base Station RF Bandwidth edge (MHz) | Type of interfering signal (Note 3) |
| 5 | ±7.5 | CW |
|  | ±17.5 | 5 MHz DFT-s-OFDM NR signal, (Note 1) |
| 10 | ±7.465 | CW |
|  | ±17.5 | 5 MHz DFT-s-OFDM NR signal, (Note 1) |
| 15 | ±7.43 | CW |
|  | ±17.5 | 5 MHz DFT-s-OFDM NR signal, (Note 1) |
| 20 | ±7.395 | CW |
|  | ±17.5 | 5 MHz DFT-s-OFDM NR signal, (Note 1) |
| 25 | ±7.465 | CW |
|  | ±25 | 20MHz DFT-s-OFDM NR signal, (Note 2) |
| 30 | ±7.43 | CW |
|  | ±25 | 20 MHz DFT-s-OFDM NR signal, (Note 2) |
| 40 | ±7.45 | CW |
|  | ±25 | 20 MHz DFT-s-OFDM NR signal, (Note 2) |
| 50 | ±7.35 | CW |
|  | ±25 | 20 MHz DFT-s-OFDM NR signal, (Note 2) |
| 60 | ±7.49 | CW |
|  | ±25 | 20 MHz DFT-s-OFDM NR signal, (Note 2) |
| 70 | ±7.42 | CW |
|  | ±25 | 20 MHz DFT-s-OFDM NR signal, (Note 2) |
| 80 | ±7.44 | CW |
|  | ±25 | 20 MHz DFT-s-OFDM NR signal, (Note 2) |
| 90 | ±7.46 | CW |
|  | ±25 | 20 MHz DFT-s-OFDM NR signal, (Note 2) |
| 100 | ±7.48 | CW |
|  | ±25 | 20 MHz DFT-s-OFDM NR signal, (Note 2) |
| NOTE 1: For the 15 kHz subcarrier spacing, the number of RB is 25. For the 30 kHz subcarrier spacing, the number of RB is 10.  NOTE 2: For the 15 kHz subcarrier spacing, the number of RB is 100. For the 30 kHz subcarrier spacing, the number of RB is 50. For the 60 kHz subcarrier spacing, the number of RB is 24.  NOTE 3: The RBs shall be placed adjacent to the transmission bandwidth configuration edge which is closer to the *Base Station RF Bandwidth* edge. | | |

Table 7.7.5-2a: Interfering signals for intermodulation requirement for band n46 and n96

|  |  |  |
| --- | --- | --- |
| *BS channel bandwidth of the lowest/highest carrier* received (MHz) | Interfering signal centre frequency offset from the lower/upper *Base Station RF Bandwidth* edge (MHz) | Type of interfering signal  (Note 2) |
| 10 | ±7.57 | CW (Note 3) |
|  | ±25 | 20 MHz DFT-s-OFDM NR signal (Note 1, 3) |
| 20 | ±7.50 | CW |
|  | ±25 | 20 MHz DFT-s-OFDM NR signal (Note 1) |
| 40 | ±7.45 | CW |
|  | ±25 | 20 MHz DFT-s-OFDM NR signal (Note 1) |
| 60 | ±7.49 | CW |
|  | ±25 | 20 MHz DFT-s-OFDM NR signal (Note 1) |
| 80 | ±7.44 | CW |
|  | ±25 | 20 MHz DFT-s-OFDM NR signal (Note 1) |
| NOTE 1: Number of RBs is 100 for 15 kHz subcarrier spacing and 50 for 30 kHz subcarrier spacing.  NOTE 2: The RBs shall be placed adjacent to the transmission bandwidth configuration edge which is closer to the *Base Station RF Bandwidth* edge.  NOTE 3: This type of interfering signal is only applied for band n46 and n96. | | |

Table 7.7.5-3: Narrowband intermodulation performance requirement in FR1

|  |  |  |  |
| --- | --- | --- | --- |
| BS type | Wanted signal mean power (dBm)  (Note 1) | Mean power of interfering signals (dBm) | Type of interfering signal |
| Wide Area BS | PREFSENS + 6 dB | -52 |  |
| Medium Range BS | PREFSENS + 6 dB | -47 | See table 7.7.5-4 |
| Local Area BS | PREFSENS + 6 dB | -44 |  |
| NOTE 1: PREFSENS depends on the RAT. For NR, PREFSENS depends also on the *BS channel bandwidth* as specified in TS 38.104 [2], table 7.2.2-1, 7.2.2-2 and 7.2.2-3. For NB-IoT, PREFSENS depends also on the *sub-carrier spacing* as specified in tables 7.2-5, 7.2-6 and 7.2-8 of TS 36.141 [24].  NOTE 2: For NB-IoT, the requirement shall apply only for a FRC A1-3 of TS 36.141 [24] mapped to the frequency range at the channel edge adjacent to the interfering signals.  NOTE 3: For NB-IoT, the frequency offset shall be adjusted to accommodate the IMD product to fall in the NB-IoT RB for NB-IoT operation in NR in-band.  NOTE 4: For NB-IoT, if a BS RF receiver fails the test of the requirement, the test shall be performed with the CW interfering signal frequency shifted away from the wanted signal by 180 kHz and the NR interfering signal frequency shifted away from the wanted signal by 360 kHz. If the BS RF receiver still fails the test after the frequency shift, then the BS RF receiver shall be deemed to fail the requirement. | | | |

Table 7.7.5-4: Interfering signals for narrowband intermodulation requirement in FR1

|  |  |  |
| --- | --- | --- |
| *BS channel bandwidth* of the lowest/highest carrier received (MHz) | Interfering RB centre frequency offset from the lower/upper Base Station RF Bandwidth edge or sub-block edge inside a sub-block gap (kHz) (Note 3) | Type of interfering signals |
| 5 | ±360 | CW |
|  | ±1420 | 5 MHz DFT-s-OFDM NR signal, 1 RB (Note 1) |
| 10 | ±370 | CW |
|  | ±1960 | 5 MHz DFT-s-OFDM NR signal, 1 RB (Note 1) |
| 15 (Note 2) | ±380 | CW |
|  | ±1960 | 5 MHz DFT-s-OFDM NR signal, 1 RB (Note 1) |
| 20 (Note 2) | ±390 | CW |
|  | ±2320 | 5 MHz DFT-s-OFDM NR signal, 1 RB (Note 1) |
| 25 (Note 2) | ±325 | CW |
|  | ±2350 | 20 MHz DFT-s-OFDM NR signal, 1 RB (Note 1) |
| 30 (Note 2) | ±335 | CW |
|  | ±2350 | 20 MHz DFT-s-OFDM NR signal, 1 RB (Note 1) |
| 40 (Note 2) | ±355 | CW |
|  | ±2710 | 20 MHz DFT-s-OFDM NR signal, 1 RB (Note 1) |
| 50 (Note 2) | ±375 | CW |
|  | ±2710 | 20 MHz DFT-s-OFDM NR signal, 1 RB (Note 1) |
| 60 (Note 2) | ±395 | CW |
|  | ±2710 | 20 MHz DFT-s-OFDM NR signal, 1 RB (Note 1) |
| 70 (Note 2) | ±415 | CW |
|  | ±2710 | 20 MHz DFT-s-OFDM NR signal, 1 RB (Note 1) |
| 80 (Note 2) | ±435 | CW |
|  | ±2710 | 20 MHz DFT-s-OFDM NR signal, 1 RB (Note 1) |
| 90 (Note 2) | ±365 | CW |
|  | ±2530 | 20 MHz DFT-s-OFDM NR signal, 1 RB (Note 1) |
| 100 (Note 2) | ±385 | CW |
|  | ±2530 | 20 MHz DFT-s-OFDM NR signal, 1 RB (Note 1) |
| NOTE 1: Interfering signal consisting of one resource block positioned at the stated offset, the *BS channel bandwidth* of the interfering signal is located adjacently to the lower/upper Base Station RF Bandwidth edge or sub-block edge inside a sub-block gap.  NOTE 2: This requirement shall apply only for a G-FRC mapped to the frequency range at the channel edge adjacent to the interfering signals.  NOTE 3: The centre of the interfering RB refers to the frequency location between the two central subcarriers. | | |

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### 7.8.5 Test requirements

For *BS type 1-C* and *BS type 1-H*, the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel as specified in annex A.1 with parameters specified in table 7.8.5-1 for Wide Area BS, in table 7.8.5-2 for Medium Range BS ,in table 7.8.5-2b for Medium Range BS for band n46 and in table 7.8.5-3 for Local Area BS in table 7.8.5-3b for Local Area BS for band n46, and in table 7.8.5-3c for Local Area BS for band n96. The characteristics of the interfering signal is further specified in annex E.

For NB-IoT operation in NR in-band, the throughput shall be ≥ 95% of the maximum throughput of the NB-IoT reference measurement channel as specified in Annex A of TS 36.141 [24] with parameters specified in table 7.8.5-1a for Wide Area BS, in table 7.8.5-2a for Medium Range BS and in table 7.8.5-3a for Local Area BS.

Table 7.8.5-1: Wide Area BS in-channel selectivity

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NR channel bandwidth | Subcarrier spacing | Reference measurement | Wanted signal mean power (dBm) | | | Interfering signal mean | Type of interfering signal |
| (MHz) | (kHz) | channel | f ≤ 3.0 GHz | 3.0 GHz < f ≤ 4.2 GHz | 4.2 GHz < f ≤ 6.0 GHz | power (dBm) |  |
| 5 | 15 | G-FR1-A1-7 | -99.2 | -98.8 | -98.5 | -81.4 | DFT-s-OFDM NR signal, 15 kHz SCS, 10 RBs |
| 10, 15, 20, 25, 30 | 15 | G-FR1-A1-1 | -97.3 | -96.9 | -96.6 | -77.4 | DFT-s-OFDM NR signal, 15 kHz SCS, 25 RBs |
| 40, 50 | 15 | G-FR1-A1-4 | -90.9 | -90.5 | -90.2 | -71.4 | DFT-s-OFDM NR signal, 15 kHz SCS, 100 RBs |
| 5 | 30 | G-FR1-A1-8 | -99.9 | -99.5 | -99.2 | -81.4 | DFT-s-OFDM NR signal, 30 kHz SCS, 5 RBs |
| 10, 15, 20, 25, 30 | 30 | G-FR1-A1-2 | -97.4 | -97 | -96.7 | -78.4 | DFT-s-OFDM NR signal, 30 kHz SCS, 10 RBs |
| 40, 50, 60, 70, 80, 90, 100 | 30 | G-FR1-A1-5 | -91.2 | -90.8 | -90.5 | -71.4 | DFT-s-OFDM NR signal, 30 kHz SCS, 50 RBs |
| 10, 15, 20, 25, 30 | 60 | G-FR1-A1-9 | -96.8 | -96.4 | -96.1 | -78.4 | DFT-s-OFDM NR signal, 60 kHz SCS, 5 RBs |
| 40, 50, 60, 70, 80, 90, 100 | 60 | G-FR1-A1-6 | -91.3 | -90.9 | -90.6 | -71.6 | DFT-s-OFDM NR signal, 60 kHz SCS, 24 RBs |
| NOTE: Wanted and interfering signal are placed adjacently around Fc, where the Fc is defined for *BS channel bandwidth* of the wanted signalaccording to the table 5.4.2.2-1 in TS 38.104 [2]. The aggregated wanted and interferer signal shall be centred in the BS channel bandwidth of the wanted signal. | | | | | | | |

Table 7.8.5-1a: Wide Area BS in-channel selectivity for NB-IoT operation in NR in-band

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *BS channel bandwidth* (MHz) | Reference measurement channel | Wanted signal mean power (dBm) | Interfering signal mean power (dBm) / BWConfig | Type of interfering signal |
| 5 |  |  | -81.4 | DFT-s-OFDM NR signal, 15 kHz SCS,  10 RBs |
| 10, 15, 20, 25, 30 | FRC A14-1 in Annex A.14 in TS 36.141 [24] | -122.9 | -77.4 | DFT-s-OFDM NR signal, 15 kHz SCS,  25 RBs |
| 40, 50 |  |  | -71.4 | DFT-s-OFDM NR signal, 15 kHz SCS,  100 RBs |
| 5 |  |  | -81.4 | DFT-s-OFDM NR signal, 15 kHz SCS,  10 RBs |
| 10, 15, 20, 25, 30 | FRC A14-2 in Annex A.14 in TS 36.141 [24] | -128.8 | -77.4 | DFT-s-OFDM NR signal, 15 kHz SCS,  25 RBs |
| 40, 50 |  |  | -71.4 | DFT-s-OFDM NR signal, 15 kHz SCS,  100 RBs |
| NOTE: Interfering signal is placed in one side of the Fc, while the NB-IoT PRB is placed on the other side. Both interfering signal and NB-IoT PRB are placed at the middle of the available PRB locations. The wanted NB-IoT tone is placed at the centre of this NB-IoT PRB. | | | | |

Table 7.8.5-2: Medium Range BS in-channel selectivity

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NR channel bandwidth | Subcarrier spacing | Reference measurement | Wanted signal mean power (dBm) | | | Interfering signal mean | Type of interfering signal |
| (MHz) | (kHz) | channel | f ≤ 3.0 GHz | 3.0 GHz < f ≤ 4.2 GHz | 4.2 GHz < f ≤ 6.0 GHz | power (dBm) |  |
| 5 | 15 | G-FR1-A1-7 | -94.2 | -93.8 | -93.5 | -76.4 | DFT-s-OFDM NR signal, 15 kHz SCS, 10 RBs |
| 10, 15, 20, 25, 30 | 15 | G-FR1-A1-1 | -92.3 | -91.9 | -91.6 | -72.4 | DFT-s-OFDM NR signal, 15 kHz SCS, 25 RBs |
| 40, 50 | 15 | G-FR1-A1-4 | -85.9 | -85.5 | -85.2 | -66.4 | DFT-s-OFDM NR signal, 15 kHz SCS, 100 RBs |
| 5 | 30 | G-FR1-A1-8 | -94.9 | -94.5 | -94.2 | -76.4 | DFT-s-OFDM NR signal, 30 kHz SCS, 5 RBs |
| 10, 15, 20, 25, 30 | 30 | G-FR1-A1-2 | -92.4 | -92 | -91.7 | -73.4 | DFT-s-OFDM NR signal, 30 kHz SCS, 10 RBs |
| 40, 50, 60, 70, 80, 90, 100 | 30 | G-FR1-A1-5 | -86.2 | -85.8 | -85.5 | -66.4 | DFT-s-OFDM NR signal, 30 kHz SCS, 50 RBs |
| 10, 15, 20, 25, 30 | 60 | G-FR1-A1-9 | -91.8 | -91.4 | -91.1 | -73.4 | DFT-s-OFDM NR signal, 60 kHz SCS, 5 RBs |
| 40, 50, 60, 70, 80, 90, 100 | 60 | G-FR1-A1-6 | -86.3 | -85.9 | -85.6 | -66.6 | DFT-s-OFDM NR signal, 60 kHz SCS, 24 RBs |
| NOTE: Wanted and interfering signal are placed adjacently around Fc, where the Fc is defined for *BS channel bandwidth* of the wanted signalaccording to the table 5.4.2.2-1 in TS 38.104 [2]. The aggregated wanted and interferer signal shall be centred in the BS channel bandwidth of the wanted signal. | | | | | | | |

Table 7.8.5-2a: Medium Range BS in-channel selectivity for NB-IoT operation in NR in-band

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *BS channel bandwidth* (MHz) | Reference measurement channel | Wanted signal mean power (dBm) | Interfering signal mean power (dBm) / BWConfig | Type of interfering signal |
| 5 |  |  | -76.4 | DFT-s-OFDM NR signal, 15 kHz SCS,  10 RBs |
| 10, 15, 20, 25, 30 | FRC A14-1 in Annex A.14 in TS 36.141 [24] | -117.9 | -72.4 | DFT-s-OFDM NR signal, 15 kHz SCS,  25 RBs |
| 40, 50 |  |  | -66.4 | DFT-s-OFDM NR signal, 15 kHz SCS,  100 RBs |
| 5 |  |  | -76.4 | DFT-s-OFDM NR signal, 15 kHz SCS,  10 RBs |
| 10, 15, 20, 25, 30 | FRC A14-2 in Annex A.14 in TS 36.141 [24] | -123.8 | -72.4 | DFT-s-OFDM NR signal, 15 kHz SCS,  25 RBs |
| 40, 50 |  |  | -66.4 | DFT-s-OFDM NR signal, 15 kHz SCS,  100 RBs |
| NOTE: Interfering signal is placed in one side of the Fc, while the NB-IoT PRB is placed on the other side. Both interfering signal and NB-IoT PRB are placed at the middle of the available PRB locations. The wanted NB-IoT tone is placed at the centre of this NB-IoT PRB. | | | | |

Table 7.8.5-2b: Medium Range BS in-channel selectivity for band n46

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *BS channel bandwidth* (MHz) | Subcarrier spacing (kHz) | Reference measurement channel | Wanted signal mean power (dBm) | Interfering signal mean power (dBm) | Type of interfering signal |
| 10 | 15 | G-FR1-A1-12 | -97.5 | -79.5 | CP-OFDM NR signal, 15 kHz SCS,  10 RBs |
|  | 30 | G-FR1-A1-13 | -95.2 | -77.4 | CP-OFDM NR signal, 30 kHz SCS,  10 RBs |
|  | 60 | G-FR1-A1-9 | -90.7 | -73.4 | DFT-s-OFDM NR signal, 60 kHz SCS,  5 RBs |
| 20 | 15 | G-FR1-A1-14 | -94.6 | -76.4 | CP-OFDM NR signal, 15 kHz SCS,  10 RBs |
|  | 30 | G-FR1-A1-15 | -91.6 | -73.4 | CP-OFDM NR signal, 30 kHz SCS,  10 RBs |
|  | 60 | G-FR1-A1-9 | -90.7 | -73.4 | DFT-s-OFDM NR signal, 60 kHz SCS,  5 RBs |
| 40 | 15 | G-FR1-A1-16 | -91.5 | -73.2 | CP-OFDM NR signal, 15 kHz SCS,  20 RBs |
|  | 30 | G-FR1-A1-17 | -88.5 | -70.2 | CP-OFDM NR signal, 30 kHz SCS,  10 RBs |
|  | 60 | G-FR1-A1-6 | -85.2 | -66.6 | DFT-s-OFDM NR signal, 60 kHz SCS,  24 RBs |
| 60 | 30 | G-FR1-A1-18 | -86.9 | -68.4 | CP-OFDM NR signal, 30 kHz SCS,  20 RBs |
|  | 60 | G-FR1-A1-6 | -85.2 | -66.6 | DFT-s-OFDM NR signal, 60 kHz SCS,  24 RBs |
| 80 | 30 | G-FR1-A1-19 | -85.6 | -67.1 | CP-OFDM NR signal, 30 kHz SCS,  20 RBs |
|  | 60 | G-FR1-A1-6 | -85.2 | -66.6 | DFT-s-OFDM NR signal, 60 kHz SCS,  24 RBs |
| NOTE: Wanted and interfering signal are placed adjacently around Fc, where the Fc is defined for *BS channel bandwidth* of the wanted signalaccording to the table 5.4.2.2-1. The aggregated wanted and interferer signal shall be centred in the BS channel bandwidth of the wanted signal. | | | | | |

Table 7.8.5-2c: Medium Range BS in-channel selectivity for band n96

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *BS channel bandwidth* (MHz) | Subcarrier spacing (kHz) | Reference measurement channel | Wanted signal mean power (dBm) | Interfering signal mean power (dBm) | Type of interfering signal |
| 20 | 15 | G-FR1-A1-14 | -93.6 | -75.4 | CP-OFDM NR signal, 15 kHz SCS,  10 RBs |
|  | 30 | G-FR1-A1-15 | -90.6 | -72.4 | CP-OFDM NR signal, 30 kHz SCS,  10 RBs |
|  | 60 | G-FR1-A1-9 | -89.7 | -72.4 | DFT-s-OFDM NR signal, 60 kHz SCS,  5 RBs |
| 40 | 15 | G-FR1-A1-16 | -90.5 | -72.2 | CP-OFDM NR signal, 15 kHz SCS,  20 RBs |
|  | 30 | G-FR1-A1-17 | -87.5 | -69.2 | CP-OFDM NR signal, 30 kHz SCS,  10 RBs |
|  | 60 | G-FR1-A1-6 | -84.2 | -65.6 | DFT-s-OFDM NR signal, 60 kHz SCS,  24 RBs |
| 60 | 30 | G-FR1-A1-18 | -85.9 | -67.4 | CP-OFDM NR signal, 30 kHz SCS,  20 RBs |
|  | 60 | G-FR1-A1-6 | -84.2 | -65.6 | DFT-s-OFDM NR signal, 60 kHz SCS,  24 RBs |
| 80 | 30 | G-FR1-A1-19 | -84.6 | -66.1 | CP-OFDM NR signal, 30 kHz SCS,  20 RBs |
|  | 60 | G-FR1-A1-6 | -84.2 | -65.6 | DFT-s-OFDM NR signal, 60 kHz SCS,  24 RBs |
| NOTE: Wanted and interfering signal are placed adjacently around Fc, where the Fc is defined for *BS channel bandwidth* of the wanted signalaccording to the table 5.4.2.2-1. The aggregated wanted and interferer signal shall be centred in the BS channel bandwidth of the wanted signal. | | | | | |

Table 7.8.5-3: Local area BS in-channel selectivity

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NR channel bandwidth | Subcarrier spacing | Reference measurement | Wanted signal mean power (dBm) | | | Interfering signal mean | Type of interfering signal |
| (MHz) | (kHz) | channel | f ≤ 3.0 GHz | 3.0 GHz < f ≤ 4.2 GHz | 4.2 GHz < f ≤ 6.0 GHz | power (dBm) |  |
| 5 | 15 | G-FR1-A1-7 | -91.2 | -90.8 | -90.5 | -73.4 | DFT-s-OFDM NR signal, 15 kHz SCS, 10 RBs |
| 10, 15, 20, 25, 30 | 15 | G-FR1-A1-1 | -89.3 | -88.9 | -88.6 | -69.4 | DFT-s-OFDM NR signal, 15 kHz SCS, 25 RB |
| 40, 50 | 15 | G-FR1-A1-4 | -82.9 | -82.5 | -82.2 | -63.4 | DFT-s-OFDM NR signal, 15 kHz SCS, 100 RBs |
| 5 | 30 | G-FR1-A1-8 | -91.9 | -91.5 | -91.2 | -73.4 | DFT-s-OFDM NR signal, 30 kHz SCS, 5 RBs |
| 10, 15, 20, 25, 30 | 30 | G-FR1-A1-2 | -89.4 | -89 | -88.7 | -70.4 | DFT-s-OFDM NR signal, 30 kHz SCS, 10 RBs |
| 40, 50, 60, 70, 80, 90, 100 | 30 | G-FR1-A1-5 | -83.2 | -82.8 | -82.5 | -63.4 | DFT-s-OFDM NR signal, 30 kHz SCS, 50 RBs |
| 10, 15, 20, 25, 30 | 60 | G-FR1-A1-9 | -88.8 | -88.4 | -88.1 | -70.4 | DFT-s-OFDM NR signal, 60 kHz SCS, 5 RBs |
| 40, 50, 60, 70, 80, 90, 100 | 60 | G-FR1-A1-6 | -83.3 | -82.9 | -82.6 | -63.6 | DFT-s-OFDM NR signal, 60 kHz SCS, 24 RBs |
| NOTE: Wanted and interfering signal are placed adjacently around Fc, where the Fc is defined for *BS channel bandwidth* of the wanted signal according to the table 5.4.2.2-1 in TS 38.104 [2]. The aggregated wanted and interferer signal shall be centred in the BS channel bandwidth of the wanted signal. | | | | | | | |

Table 7.8.5-3a: Local Area BS in-channel selectivity for NB-IoT operation in NR in-band

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *BS channel bandwidth* (MHz) | Reference measurement channel | Wanted signal mean power (dBm) | Interfering signal mean power (dBm) / BWConfig | Type of interfering signal |
| 5 |  |  | -73.4 | DFT-s-OFDM NR signal, 15 kHz SCS,  10 RBs |
| 10, 15, 20, 25, 30 | FRC A14-1 in Annex A.14 in TS 36.104 [13] | -114.9 | -69.4 | DFT-s-OFDM NR signal, 15 kHz SCS,  25 RBs |
| 40, 50 |  |  | -63.4 | DFT-s-OFDM NR signal, 15 kHz SCS,  100 RBs |
| 5 |  |  | -73.4 | DFT-s-OFDM NR signal, 15 kHz SCS,  10 RBs |
| 10, 15, 20, 25, 30 | FRC A14-2 in Annex A.14 in TS 36.104 [13] | -120.8 | -69.4 | DFT-s-OFDM NR signal, 15 kHz SCS,  25 RBs |
| 40, 50 |  |  | -63.4 | DFT-s-OFDM NR signal, 15 kHz SCS,  100 RBs |
| NOTE: Interfering signal is placed in one side of the Fc, while the NB-IoT PRB is placed on the other side. Both interfering signal and NB-IoT PRB are placed at the middle of the available PRB locations. The wanted NB-IoT tone is placed at the centre of this NB-IoT PRB. | | | | |

Table 7.8.2-3b: Local Area BS in-channel selectivity for band n46

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *BS channel bandwidth* (MHz) | Subcarrier spacing (kHz) | Reference measurement channel | Wanted signal mean power (dBm) | Interfering signal mean power (dBm) | Type of interfering signal |
| 10 | 15 | G-FR1-A1-12 | -94.5 | -76.5 | CP-OFDM NR signal, 15 kHz SCS,  10 RBs |
|  | 30 | G-FR1-A1-13 | -92.2 | -74.4 | CP-OFDM NR signal, 30 kHz SCS,  10 RBs |
|  | 60 | G-FR1-A1-9 | -87.7 | -70.4 | DFT-s-OFDM NR signal, 60 kHz SCS,  5 RBs |
| 20 | 15 | G-FR1-A1-14 | -91.6 | -73.4 | CP-OFDM NR signal, 15 kHz SCS,  10 RBs |
|  | 30 | G-FR1-A1-15 | -88.6 | -70.4 | CP-OFDM NR signal, 30 kHz SCS,  10 RBs |
|  | 60 | G-FR1-A1-9 | -87.7 | -70.4 | DFT-s-OFDM NR signal, 60 kHz SCS,  5 RBs |
| 40 | 15 | G-FR1-A1-16 | -88.5 | -70.2 | CP-OFDM NR signal, 15 kHz SCS,  20 RBs |
|  | 30 | G-FR1-A1-17 | -85.5 | -67.2 | CP-OFDM NR signal, 30 kHz SCS,  10 RBs |
|  | 60 | G-FR1-A1-6 | -82.2 | -63.6 | DFT-s-OFDM NR signal, 60 kHz SCS,  24 RBs |
| 60 | 30 | G-FR1-A1-18 | -83.9 | -65.4 | CP-OFDM NR signal, 30 kHz SCS,  20 RBs |
|  | 60 | G-FR1-A1-6 | -82.2 | -63.6 | DFT-s-OFDM NR signal, 60 kHz SCS,  24 RBs |
| 80 | 30 | G-FR1-A1-19 | -82.6 | -64.1 | CP-OFDM NR signal, 30 kHz SCS,  20 RBs |
|  | 60 | G-FR1-A1-6 | -82.2 | -63.6 | DFT-s-OFDM NR signal, 60 kHz SCS,  24 RBs |
| NOTE: Wanted and interfering signal are placed adjacently around Fc, where the Fc is defined for BS channel bandwidth of the wanted signal according to the table 5.4.2.2-1. The aggregated wanted and interferer signal shall be centred in the BS channel bandwidth of the wanted signal. | | | | | |

Table 7.8.2-3c: Local Area BS in-channel selectivity for band n96

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *BS channel bandwidth* (MHz) | Subcarrier spacing (kHz) | Reference measurement channel | Wanted signal mean power (dBm) | Interfering signal mean power (dBm) | Type of interfering signal |
| 20 | 15 | G-FR1-A1-14 | -90.6 | -72.4 | CP-OFDM NR signal, 15 kHz SCS,  10 RBs |
|  | 30 | G-FR1-A1-15 | -87.6 | -69.4 | CP-OFDM NR signal, 30 kHz SCS,  10 RBs |
|  | 60 | G-FR1-A1-9 | -86.7 | -69.4 | DFT-s-OFDM NR signal, 60 kHz SCS,  5 RBs |
| 40 | 15 | G-FR1-A1-16 | -87.5 | -69.2 | CP-OFDM NR signal, 15 kHz SCS,  20 RBs |
|  | 30 | G-FR1-A1-17 | -84.5 | -66.2 | CP-OFDM NR signal, 30 kHz SCS,  10 RBs |
|  | 60 | G-FR1-A1-6 | -81.2 | -62.6 | DFT-s-OFDM NR signal, 60 kHz SCS,  24 RBs |
| 60 | 30 | G-FR1-A1-18 | -82.9 | -64.4 | CP-OFDM NR signal, 30 kHz SCS,  20 RBs |
|  | 60 | G-FR1-A1-6 | -81.2 | -62.6 | DFT-s-OFDM NR signal, 60 kHz SCS,  24 RBs |
| 80 | 30 | G-FR1-A1-19 | -81.6 | -63.1 | CP-OFDM NR signal, 30 kHz SCS,  20 RBs |
|  | 60 | G-FR1-A1-6 | -81.2 | -62.6 | DFT-s-OFDM NR signal, 60 kHz SCS,  24 RBs |
| NOTE: Wanted and interfering signal are placed adjacently around Fc, where the Fc is defined for *BS channel bandwidth* of the wanted signalaccording to the table 5.4.2.2-1. The aggregated wanted and interferer signal shall be centred in the BS channel bandwidth of the wanted signal. | | | | | |

**<Next of change>**

# A.1 Fixed Reference Channels for reference sensitivity level, ACS, in-band blocking, out-of-band blocking, receiver intermodulation and in-channel selectivity (QPSK, R=1/3)

The parameters for the reference measurement channels are specified in table A.1-1 for FR1 reference sensitivity level, ACS, in-band blocking, out-of-band blocking, receiver intermodulation and in-channel selectivity. The parameters for the band n46 and n96 reference measurement channels are specified in table A.1-1a for reference sensitivity level, ACS, in-band blocking, out-of-band blocking, receiver intermodulation, in-channel selectivity.

Table A.1-1: FRC parameters for FR1 reference sensitivity level, ACS, in-band blocking, out-of-band blocking, receiver intermodulation and in-channel selectivity

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Reference channel | G-FR1-A1-1 | G-FR1-A1-2 | G-FR1-A1-3 | G-FR1-A1-4 | G-FR1-A1-5 | G-FR1-A1-6 | G-FR1-A1-7 | G-FR1-A1-8 | G-FR1-A1-9 | G-FR1-A1-10 | G-FR1-A1-11 |
| Subcarrier spacing (kHz) | 15 | 30 | 60 | 15 | 30 | 60 | 15 | 30 | 60 | 15 | 15 |
| Allocated resource blocks | 25 | 11 | 11 | 106 | 51 | 24 | 15 | 6 | 6 | 24 | 105 |
| CP-OFDM Symbols per slot (Note 1) | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Modulation | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK |
| Code rate (Note 2) | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 |
| Payload size (bits) | 2152 | 984 | 984 | 9224 | 4352 | 2088 | 1320 | 528 | 528 | [2088] | [8968] |
| Transport block CRC (bits) | 16 | 16 | 16 | 24 | 24 | 16 | 16 | 16 | 16 | 16 | 24 |
| Code block CRC size (bits) | - | - | - | 24 | - | - | - | - | - | - | 24 |
| Number of code blocks - C | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 |
| Code block size including CRC (bits) (Note 3) | 2168 | 1000 | 1000 | 4648 | 4376 | 2104 | 1336 | 544 | 544 | [2104] | [4520] |
| Total number of bits per slot | 7200 | 3168 | 3168 | 30528 | 14688 | 6912 | 4320 | 1728 | 1728 | [6912] | [30240] |
| Total symbols per slot | 3600 | 1584 | 1584 | 15264 | 7344 | 3456 | 2160 | 864 | 864 | [3456] | [15120] |
| NOTE 1: DM-RS configuration type = 1 with DM-RS duration = single-symbol DM-RS, additional DM-RS position = pos1 with *l0* = 2, *l* = 11 as per table 6.4.1.1.3-3 of TS 38.211 [17].  NOTE 2: MCS index 4 and target coding rate = 308/1024 are adopted to calculate payload size.  NOTE 3: Code block size including CRC (bits) equals to *K'* in TS 38.212 [16], clause 5.2.2. | | | | | | | | | | | |

Table A.1-1a: FRC parameters for band n46 and n96 reference sensitivity level, ACS, in-band blocking, out-of-band blocking, receiver intermodulation, in-channel selectivity

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Reference channel | G-FR1-A1-12 | G-FR1-A1-13 | G-FR1-A1-14 | G-FR1-A1-15 | G-FR1-A1-16 | G-FR1-A1-17 | G-FR1-A1-18 | G-FR1-A1-19 |
| Channel bandwidth (MHz) | 10 | 10 | 20 | 20 | 40 | 40 | 60 | 80 |
| Subcarrier spacing (kHz) | 15 | 30 | 15 | 30 | 15 | 30 | 30 | 30 |
| Allocated resource blocks | 5 | 4 | 10 | 10 | 21 | 21 | 32 | 43 |
| CP-OFDM Symbols per slot (Note 1) | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Modulation | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK |
| Code rate (Note 2) | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 |
| Payload size (bits) | 432 | 352 | 888 | 888 | 1864 | 1864 | 2792 | 3752 |
| Transport block CRC (bits) | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| Code block CRC size (bits) | - | - | - | - | - | - | - | - |
| Number of code blocks - C | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Code block size including CRC (bits) (Note 3) | 448 | 368 | 904 | 904 | 1880 | 1880 | 2808 | 3768 |
| Total number of bits per slot | 1440 | 1152 | 2880 | 2880 | 6048 | 6048 | 9216 | 12384 |
| Total symbols per slot | 720 | 576 | 1440 | 1440 | 3024 | 3024 | 4608 | 6192 |
| NOTE 1: *UL-DMRS-config-type* = 1 with *UL-DMRS-max-len* = 1, *UL-DMRS-add-pos* = 1 with = 2, = 11 as per table 6.4.1.1.3-3 of TS 38.211 [5].  NOTE 2: MCS index 4 and target coding rate = 308/1024 are adopted to calculate payload size for receiver sensitivity and in-channel selectivity  NOTE 3: Code block size including CRC (bits) equals to  in sub-clause 5.2.2 of TS 38.212 [15].  NOTE 4: For reference channel A1-12, the allocated RB’s are uniformly spaced over the channel bandwidth at RB index N, N+10, N+20, N+30, N+40 where N={0,1,2,3,4,…,9}.  NOTE 5: For reference channel A1-13, the allocated RB’s are uniformly spaced over the channel bandwidth at RB index N, N+5, N+10, N+15 where N={0,1,2,3,4}.  NOTE 7: For reference channel A1-14, the allocated RB’s are uniformly spaced over the channel bandwidth at RB index N, N+10,N+20,..N+90 where N={0,1,2,3,...,9}.  NOTE 8: For reference channel A1-15, the allocated RB’s are uniformly spaced over the channel bandwidth at RB index N, N+5,N+10,..,N+45 where N={0,1,2,3,4}.  NOTE 10: For reference channel A1-16, the allocated RB’s are uniformly spaced over the channel bandwidth at RB index N, N+10,N+20,...,N+200 where N={0,1,2,3,4,...,9}.  NOTE 11: For reference channel A1-17, the allocated RB’s are uniformly spaced over the channel bandwidth at RB index N, N+5, N+10, ..., N+100 where N={0,1,2,3,4}.  NOTE 12: For reference channel A1-18, the allocated RB’s are uniformly spaced over the channel bandwidth at RB index N, N+5,N+10,...,N+155 where N={0,1,2,3,4}.  NOTE 13: For reference channel A1-19, the allocated RB’s are uniformly spaced over the channel bandwidth at RB index N, N+5,N+10,...,N+210 where N={0,1,2,3,4}. | | | | | | | | |

# A.2 Fixed Reference Channels for dynamic range (16QAM, R=2/3)

The parameters for the reference measurement channels are specified in table A.2-1 for FR1 dynamic range. The parameters for the band n46 and n96 reference measurement channels are specified in table A.2-1a and A.2-1b for band n46 and n96 dynamic range.

Table A.2-1: FRC parameters for FR1 dynamic range

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Reference channel | G-FR1-A2-1 | G-FR1-A2-2 | G-FR1-A2-3 | G-FR1-A2-4 | G-FR1-A2-5 | G-FR1-A2-6 |
| Subcarrier spacing (kHz) | 15 | 30 | 60 | 15 | 30 | 60 |
| Allocated resource blocks | 25 | 11 | 11 | 106 | 51 | 24 |
| CP-OFDM Symbols per slot (Note 1) | 12 | 12 | 12 | 12 | 12 | 12 |
| Modulation | 16QAM | 16QAM | 16QAM | 16QAM | 16QAM | 16QAM |
| Code rate (Note 2) | 2/3 | 2/3 | 2/3 | 2/3 | 2/3 | 2/3 |
| Payload size (bits) | 9224 | 4032 | 4032 | 38936 | 18960 | 8968 |
| Transport block CRC (bits) | 24 | 24 | 24 | 24 | 24 | 24 |
| Code block CRC size (bits) | 24 | - | - | 24 | 24 | 24 |
| Number of code blocks - C | 2 | 1 | 1 | 5 | 3 | 2 |
| Code block size including CRC (bits)  (Note 3) | 4648 | 4056 | 4056 | 7816 | 6352 | 4520 |
| Total number of bits per slot | 14400 | 6336 | 6336 | 61056 | 29376 | 13824 |
| Total symbols per slot | 3600 | 1584 | 1584 | 15264 | 7344 | 3456 |
| NOTE 1: DM-RS configuration type = 1 with DM-RS duration = single-symbol DM-RS, additional DM-RS position = pos1 with *l0* = 2, *l* = 11 as per table 6.4.1.1.3-3 of TS 38.211 [17].  NOTE 2: MCS index 16 and target coding rate = 658/1024 are adopted to calculate payload size.  NOTE 3: Code block size including CRC (bits) equals to *K'* in TS 38.212 [16], clause 5.2.2. | | | | | | |

Table A.2-1a: FRC parameters for dynamic range for band n46 and n96

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Reference channel | G-FR1-A2-7 | G-FR1-A2-8 | G-FR1-A2-9 | G-FR1-A2-10 | G-FR1-A2-11 | G-FR1-A2-12 | G-FR1-A2-13 | G-FR1-A2-14 |
| Channel bandwidth (MHz) | 10 | 10 | 20 | 20 | 40 | 40 | 60 | 80 |
| Subcarrier spacing (kHz) | 15 | 30 | 15 | 30 | 15 | 30 | 30 | 30 |
| Allocated resource blocks | 5 | 4 | 10 | 10 | 21 | 21 | 32 | 43 |
| CP-OFDM Symbols per slot (Note 1) | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Modulation | 16QAM | 16QAM | 16QAM | 16QAM | 16QAM | 16QAM | 16QAM | 16QAM |
| Code rate (Note 2) | 2/3 | 2/3 | 2/3 | 2/3 | 2/3 | 2/3 | 2/3 | 2/3 |
| Payload size (bits) | 1864 | 1480 | 3752 | 3752 | 7808 | 7808 | 11784 | 15880 |
| Transport block CRC (bits) | 16 | 16 | 16 | 16 | 24 | 24 | 24 | 24 |
| Code block CRC size (bits) | - | - | - | - | - | - | 24 | 24 |
| Number of code blocks - C | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 |
| Code block size including CRC (bits) (Note 3) | 1880 | 1496 | 3768 | 3768 | 7832 | 7832 | 5928 | 7976 |
| Total number of bits per slot | 2880 | 2304 | 5760 | 5760 | 12096 | 12096 | 18432 | 24768 |
| Total symbols per slot | 720 | 576 | 1440 | 1440 | 3024 | 3024 | 4608 | 6192 |
| NOTE 1: DM-RS configuration type = 1 with DM-RS duration = single-symbol DM-RS, additional DM-RS position = pos1 with l0= 2, l = 11 as per table 6.4.1.1.3-3 of TS 38.211 [5].  NOTE 2: MCS index 16 and target coding rate = 658/1024 are adopted to calculate payload size.  NOTE 3: Code block size including CRC (bits) equals to K' in sub-clause 5.2.2 of TS 38.212 [15].  NOTE 4: For reference channel A2-7, the allocated RB’s are uniformly spaced over the channel bandwidth at RB index N, N+10, N+20, N+30, N+40 where N={0,1,2,3,4,5,6,7,8,9}.  NOTE 5: For reference channel A2-8, the allocated RB’s are uniformly spaced over the channel bandwidth at RB index N, N+5, N+10, N+15 where N={0,1,2,3,4}.  NOTE 6: For reference channel A2-9, the allocated RB’s are uniformly spaced over the channel bandwidth at RB index N, N+10,N+20,..N+90 where N={0,1,2,3,...,9}.  NOTE 7: For reference channel A2-10, the allocated RB’s are uniformly spaced over the channel bandwidth at RB index N, N+5,N+10,.., N+45 where N={0,1,2,3,4}.  NOTE 8: For reference channel A2-11, the allocated RB’s are uniformly spaced over the channel bandwidth at RB index N, N+10,N+20,...,N+200 where N={0,1,2,3,4,...,9}.  NOTE 9: For reference channel A2-12, the allocated RB’s are uniformly spaced over the channel bandwidth at RB index N, N+5, N+10, ..., N+100 where N={0,1,2,3,4}.  NOTE 10: For reference channel A2-13, the allocated RB’s are uniformly spaced over the channel bandwidth at RB index N, N+5,N+10,..., N+155 where N={0,1,2,3,4}.  NOTE 11: For reference channel A2-14, the allocated RB’s are uniformly spaced over the channel bandwidth at RB index N, N+5,N+10,..., N+210 where N={0,1,2,3,4}. | | | | | | | | |

**<End of change>**