**3GPP TSG-RAN4 Meeting # 100-e *R4-2115845***

 **Electronic meeting, August 16 – 27, 2021**

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
|  |
|  | **38.141-1** | **CR** | **<CR#>** | **rev** | **-** | **Current version:** | **16.8.0** |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network | **X** | Core Network |  |

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|  |
| ***Title:***  | Big CR for TS 38.141-1 Maintenance RF part (Rel-16, CAT F) |
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| ***Source to WG:*** | MCC, Nokia |
| ***Source to TSG:*** | R4 |
|  |  |
| ***Work item code:*** | NR\_newRAT-PerfNB\_IOTenh3-PerfNR\_RF\_FR1-PerfNR\_unlic-Perf  |  | ***Date:*** | 2021-08-29 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-16 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-15 (Release 15)Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)* |
|  |  |
| ***Reason for change:*** | This big CR merges the multiple endorsed draft CRs. The reason for change in each endorsed draft CR is copied below.R4-2113497 Draft CR to TS 38.141-1 NRTC4 test configuration correctionThis is draft CR to TS 38.141-1 with proposal to correct test configuration NRTC4 description. Following description exist in specification in clause 4.7.6.1:“*NRTC4 is based on re-using the previously specified test configurations (NRTC1, NRTC2 and NRTC3) applicable per band involved in multi-band operation. It is constructed using the following method*”However NRTC4 should use NRTC1 configuration, thus to avoid confusion it is proposed to remove “(NRTC1, NRTC2 and NRTC3)”. Currently it is already descirbed in 4th bullet that only NRTC1 configuration is used:*“- Each concerned band shall be considered as an independent band and the carrier placement in each band shall be according to NRTC1, where the declared parameters for multi-band operation shall apply. The mirror image of the single-band test configuration shall be used in each alternate band(s) and in the highest band being.”*R4-2112269 Draft CR to TS 38.141-1: Clarification of power boosted NB-IoT RB placementIt is unclear in which NR carrier the power boosted NB-IoT RB shall be placed when there are more than one NR carriers in the test configurations: within the same NR carrier or within the NR carriers at the lower and upper edges of the BS RF bandwidth.R4-2112273 Draft CR to TS 38.141-1: Addition of FCC emission limits on US 3.45-3.55 GHz bandFCC emission limits in US 3.45-3.55 GHz band are not specified for Band n77.R4-2115685 Maintenance CR to TS 38.141-1: NR-U BS conformance testing requirements1) The following NOTE 2 for NR-U BS REFSENS requirement in section 7.2.5 is misleading, since FRC defined for NR-U BS REFSENS include from G-FR1-A1-12 to G-FR1-A1-19 instead of only G-FR1-A1-12 and G-FR1-A1-19.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.2) In Table Table Table 7.3.5-2b and Table Table 7.3.5-2c NOTE, interleaved FRC should be added on top of consecutive FRCR4-2115812 Draft CR to TS 38.141-1 – Test configuration for non-contiguous transmission testing for band n46 and n96 |
|  |  |
| ***Summary of change:*** | The summary of change in each each endorsed draft CR is copied below. R4-2113497 Draft CR to TS 38.141-1 NRTC4 test configuration correctionCorrection to NRTC4 descriprtion by removing adding “(NRTC1, NRTC2 and NRTC3)”.R4-2112269 Draft CR to TS 38.141-1: Clarification of power boosted NB-IoT RB placementClarify that the power boosted NB-IoT RB shall be placed at the lower and upper edges of the BS RF bandwidth.R4-2112273 Draft CR to TS 38.141-1: Addition of FCC emission limits on US 3.45-3.55 GHz bandSpecify the FCC emission limits in US 3.45-3.55 GHz band as additional regional spurious emissions requirements for Band n77.R4-2115685 Maintenance CR to TS 38.141-1: NR-U BS conformance testing requirements1) Update the NOTE 2 in Table 7.2.5-2a and Table 7.2.5-2b,Table 7.2.5-3a,Table 7.2.5-3b as following to aligned with dynamic range part: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, except for one instance that might overlap one other instance to cover the full BS channel bandwidth.2) In Table 7.3.5-2b: and Table 7.3.5-2c: NOTE, interleaved FRC is added3) Add one more sentence in Table Table 7.3.5-3b and Table Table 7.3.5-3c NOTE.4) Some clarity for 60kHz reference measurement channel are also added.5) Some typos in dynamic range requirement is corrected.R4-2115812 Draft CR to TS 38.141-1 – Test configuration for non-contiguous transmission testing for band n46 and n96 |
|  |  |
| ***Consequences if not approved:*** | The consequences if not approved for each endorsed draft CR are coppied below.R4-2113497 Draft CR to TS 38.141-1 NRTC4 test configuration correctionDefinition of NRTC4 in conducted specification will be still ambigous.R4-2112269 Draft CR to TS 38.141-1: Clarification of power boosted NB-IoT RB placementIt remains unclear in which NR carrier the power boosted NB-IoT RB shall be placed when there are more than one NR carriers in the test configurations and would lead to different interpretations.R4-2112273 Draft CR to TS 38.141-1: Addition of FCC emission limits on US 3.45-3.55 GHz bandBand n77 cannot be used to cover US 3.45-3.55 GHz band.R4-2115685 Maintenance CR to TS 38.141-1: NR-U BS conformance testing requirementsNR-U BS conformance testing requirement is not defined correctly.R4-2115812 Draft CR to TS 38.141-1 – Test configuration for non-contiguous transmission testing for band n46 and n96 |
|  |  |
| ***Clauses affected:*** | R4-2113497 Draft CR to TS 38.141-1 NRTC4 test configuration correction4.7.6.1R4-2112269 Draft CR to TS 38.141-1: Clarification of power boosted NB-IoT RB placement4.7.3.1, 4.7.5.1R4-2112273 Draft CR to TS 38.141-1: Addition of FCC emission limits on US 3.45-3.55 GHz band6.6.5.5.1.3R4-2115685 Maintenance CR to TS 38.141-1: NR-U BS conformance testing requirements7.2.5, 7.3.5R4-2115812 Draft CR to TS 38.141-1 – Test configuration for non-contiguous transmission testing for band n46 and n964.8.3, 4.8.4, New clause added 4.7.8 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

## **<Start of Change 1>**

4.7.3 NRTC1: Contiguous spectrum operation

The purpose of test configuration NRTC1 is to test all BS requirements excluding CA occupied bandwidth.

For NRTC1 used in receiver tests only the two outermost carriers within each supported operating band need to be generated by the test equipment;

4.7.3.1 NRTC1 generation

NRTC1 shall be constructed on a per band basis using the following method:

- Declared maximum Base Station RF Bandwidth supported for contiguous spectrum operation (D.11) shall be used;

- Select the carrier to be tested according to 4.7.2 and place it adjacent to the lower Base Station RF Bandwidth edge. Place same signal adjacent to the upper Base Station RF Bandwidth edge.

- If NB-IoT operation in NR in-band is supported, place the power boosted NB-IoT RB at the lower outermost RB at the lower Base Station RF Bandwidth edge eligible for NB-IoT operation in NR in-band according to clause 5.7.3 of TS 36.104 [22] and the definition in clause 3.1. If more than one NB-IoT carrier is supported with NB-IoT operation in NR in-band, place the power boosted NB-IoT RB at the upper outermost RB at the upper Base Station RF Bandwidth edge eligible for NB-IoT operation in NR in-band.

- For transmitter tests, select as many carriers (according to 4.7.2) that the BS supports within an *operating band* and fit in the rest of the declared maximum Base Station RF Bandwidth (D.11). Place the carriers adjacent to each other starting from the upper Base Station RF Bandwidth edge. The nominal channel spacing defined in TS 38.104 [2], clause 5.4.1 shall apply.

The test configuration should be constructed sequentially on a per band basis for all component carriers of the inter-band CA bands declared to be supported by the BS and are transmitted using the same *antenna connector*. All configured component carriers are transmitted simultaneously in the tests where the transmitter should be ON.

4.7.3.2 NRTC1 power allocation

Set the power spectral density of each carrier to the same level so that the sum of the carrier powers equals the rated total output power (Prated,t,AC, or Prated,t,TABC, D.22) according to the manufacturer's declaration in clause 4.6.

4.7.4 NRTC2: Contiguous CA occupied bandwidth

## **<End of Change 1>**

## **<Start of Change 2>**

4.7.5 NRTC3: Non-contiguous spectrum operation

The purpose of NRTC3 is to test all BS requirements excluding CA occupied bandwidth.

For NRTC3 used in receiver tests, outermost carriers for each sub-block need to be generated by the test equipment; other supported carriers are optional to be generated.

4.7.5.1 NRTC3 generation

NRTC3 is constructed on a per band basis using the following method:

- The Base Station RF Bandwidth shall be the maximum Base Station RF Bandwidth supported for non-contiguous spectrum operation (D.11). The Base Station RF Bandwidth consists of one sub-block gap and two sub-blocks located at the edges of the declared maximum supported Base Station RF Bandwidth (D.11).

- Select the carrier to be tested according to 4.7.2. Place it adjacent to the upper Base Station RF Bandwidth edge and another carrier (as described in 4.7.2) adjacent to the lower Base Station RF Bandwidth edge.

- If NB-IoT operation in NR in-band is supported, place the power boosted NB-IoT RB at the lower outermost RB at the lower Base Station RF Bandwidth edge eligible for NB-IoT operation in NR in-band according to clause 5.7.3 of TS 36.104 [22] and the definition in clause 3.1. If more than one NB-IoT carrier is supported with NB-IoT operation in NR in-band, place the power boosted NB-IoT RB at the upper outermost RB at the upper Base Station RF Bandwidth edge eligible for NB-IoT operation in NR in-band.

- For single-band operation receiver tests, if the remaining gap is at least 15 MHz (or 60 MHz if channel bandwidth of the carrier to be tested is 20 MHz) plus two times the channel BW used in the previous step and the BS supports at least 4 carriers, place a carrier of this BW adjacent to each already placed carrier for each sub-block. The nominal channel spacing defined in TS 38.104 [2], clause 5.4.1 shall apply.

- The sub-block edges adjacent to the sub-block gap shall be determined using the specified Foffset\_high and Foffset\_low for the carriers adjacent to the sub-block gap.

4.7.5.2 NRTC3 power allocation

Set the power of each carrier to the same level so that the sum of the carrier powers equals the rated total output power (Prated,t,AC, or Prated,t,TABC, D.22) according to the manufacturer's declaration in clause 4.6.

4.7.6 NRTC4: Multi-band test configuration for full carrier allocation

## **<End of Change 2>**

## **<Start of Change 3>**

4.7.6 NRTC4: Multi-band test configuration for full carrier allocation

The purpose of NRTC4 is to test multi-band operation aspects considering maximum supported number of carriers.

4.7.6.1 NRTC4 generation

NRTC4 is based on re-using the previously specified test configurations applicable per band involved in multi-band operation. It is constructed using the following method:

- The Base Station RF Bandwidth of each supported operating band shall be the declared maximum Base Station RF Bandwidth in multi-band operation (D.12).

- The number of carriers of each supported *operating band* shall be the declared maximum number of supported carriers per operating band in multi-band operation (D. 18). Carriers shall be selected according to 4.7.2 and shall first be placed at the outermost edges of the declared maximum Radio Bandwidth. Additional carriers shall next be placed at the Base Station RF Bandwidths edges, if possible.

- The allocated Base Station RF Bandwidth of the outermost bands shall be located at the outermost edges of the declared maximum Radio Bandwidth.

- Each concerned band shall be considered as an independent band and the carrier placement in each band shall be according to NRTC1, where the declared parameters for multi-band operation shall apply. The mirror image of the single-band test configuration shall be used in each alternate band(s) and in the highest band being.

- If only three carriers are supported, two carriers shall be placed in one band according to the relevant test configuration while the remaining carrier shall be placed at the edge of the maximum *Radio Bandwidth* in the other band.

- If the sum of the maximum Base Station RF Bandwidths of each supported *operating bands* is larger than the declared *Total RF Bandwidth* BWtot (D.13) of transmitter and receiver for the declared band combinations of the BS, repeat the steps above for test configurations where the Base Station RF Bandwidth of one of the operating band shall be reduced so that the *Total RF Bandwidth* of transmitter and receiver is not exceeded and vice versa.

- If the sum of the maximum number of supported carriers per operating band in multi-band operation (D.18) is larger than the declared total maximum number of supported carriers in multi-band operation (D. 19), repeat the steps above for test configurations where in each test configuration the number of carriers of one of the operating band shall be reduced so that the total number of supported carriers is not exceeded and vice versa.

4.7.6.2 NRTC4 power allocation

Unless otherwise stated, set the power of each carrier in all supported *operating bands* to the same power so that the sum of the carrier powers equals the rated total output power (Prated,t,AC or Prated,t,TABC, D.22) according to the manufacturer's declaration.

If the allocated power of a supported *operating band(s)* exceeds the declared rated total output power of the *operating band(s)* in multi-band operation, the exceeded part shall, if possible, be reallocated into the other band(s). If the power allocated for a carrier exceeds the rated output power declared for that carrier, the exceeded power shall, if possible, be reallocated into the other carriers.

4.7.7 NRTC5: Multi-band test configuration with high PSD per carrier

## **<End of Change 3>**

## **<Start of Change 4>**

4.7.7.2 NRTC5 power allocation

Unless otherwise stated, set the power of each carrier in all supported *operating bands* to the same power so that the sum of the carrier powers equals the total rated output power (Prated,t,AC or Prated,t,TABC, D.22) according to the manufacturer's declaration.

If the allocated power of a supported *operating band(s)* exceeds the declared rated total output power of the *operating band(s)* in multi-band operation, the exceeded part shall, if possible, be reallocated into the other band(s). If the power allocated for a carrier exceeds the rated output power declared for that carrier, the exceeded power shall, if possible, be reallocated into the other carriers.

4.7.8 NRTC6: Non-contiguous spectrum operation in band n46 and n96

The purpose of test configuration NRTC6 is to test operating band unwanted emission (OBUE) for one or two non-transmitted channels for band n46 and n96 operation with 60 MHz and or 80 MHz channel bandwidth.

4.7.8.1 NRTC6 generation

NRTC6 shall be constructed on a per band basis using the following method:

- Declared maximum Base Station RF Bandwidth supported for contiguous spectrum operation (D.11) shall be used.

- For band n46 and n96 operation, place two carriers (according to 4.7.2) at the upper edge of the BS channel bandwidth for the carrier adjacent to the upper Base Station RF Bandwidth edge and two carriers at the lower edge of the BS channel bandwidth for the carrier adjacent to the lower Base Station RF Bandwidth edge.

- For transmitter tests, select as many 60 MHz channel bandwidth (with 101 pattern for non-contiguous transmission) and/or 80 MHz channel bandwidth with 1101 pattern for non-contiguous transmission) that the BS supports within an *operating band* and fit in the rest of the declared maximum Base Station RF Bandwidth (D.11). Place the 60 MHz channel bandwidth (with 101 pattern for non-contiguous transmission) and/or 80 MHz channel bandwidth with 1101 pattern for non-contiguous transmission) adjacent to each other starting from the upper Base Station RF Bandwidth edge. The nominal channel spacing defined in TS 38.104 [2], clause 5.4.1 shall apply.

The test configuration should be constructed sequentially on a per band basis for all component carriers of the inter-band CA bands declared to be supported by the BS and are transmitted using the same *antenna connector*. All configured component carriers are transmitted simultaneously in the tests where the transmitter should be ON.

4.7.8.2 NRTC6 power allocation

Set the power spectral density of each carrier to the same level so that the sum of the carrier powers equals the rated total output power (Prated,t,AC, or Prated,t,TABC, D.22) according to the manufacturer's declaration in clause 4.6.

## 4.8 Applicability of requirements

## **<End of Change 4>**

## **<Start of Change 5>**

4.8.3 Applicability of test configurations for single-bandoperation

The applicable test configurations are specified in the tables below for each the supported RF configuration, which shall be declared according to clause 4.6. The generation and power allocation for each test configuration is defined in clause 4.7. This clause contains the test configurations for a BS capable of single carrier, multi-carrier and/or CA operation in both contiguous and non-contiguous spectrum in single band.

For a BS declared to be capable of single carrier operation only (D.16), a single carrier (SC) shall be used for testing.

For a BSdeclared to support multi-carrier and/or CA operation in contiguous spectrum within a single band (D.15-D.16), the test configurations in the second column of table 4.8.3-1 shall be used for testing.

For a BSdeclared to support multi-carrier and/or CA operation in contiguous and non-contiguous spectrum within a single band (D.15-D.16) and where the parameters in the manufacture's declaration according to clause 4.6 are identical for contiguous (C) and non-contiguous (NC) spectrum operation (D.9), the test configurations in the third column of table 4.8.3-1 shall be used for testing.

For a BSdeclared to support multi-carrier and/or CA in operation contiguous and non-contiguous spectrum within a single band (D.15-D.16) and where the parameters in the manufacture's declaration according to clause 4.6 are not identical for contiguous (C) and non-contiguous (NC) spectrum operation (D.9), the test configurations in the fourth column of table 4.8.3-1 shall be used for testing.

For a BS declared to support band n46 and/or band n96 operation with 60 MHz and or 80 MHz channel bandwidth with non-contigous transmission, for operation band unwanted emission, the test configuration NRTC6 shall be used.

Unless otherwise stated, single carrier configuration (SC) tests shall be performed using signal with narrowest supported channel bandwidth and the smallest supported sub-carrier spacing.

**Table 4.8.3-1: Test configurations for a BS capable of multi-carrier and/or CA in a single band**

|  |  |  |  |
| --- | --- | --- | --- |
| **BS test case** | **Contiguous spectrum capable BS** | **C and NC capable BS with identical parameters** | **C and NC capable BS with different parameters** |
| Base station output power | NRTC1 | NRTC1 | NRTC1, NRTC3 |
| RE Power control dynamic range | Tested with Error Vector Magnitude | Tested with Error Vector Magnitude | Tested with Error Vector Magnitude |
| Total power dynamic range (Note 3) | SC | SC | SC |
| Transmit ON/OFF power (only applied for NR TDD BS) | NRTC1 | NRTC1 | NRTC1, NRTC3 |
| Frequency error | Tested with Error Vector Magnitude | Tested with Error Vector Magnitude | Tested with Error Vector Magnitude |
| Error Vector Magnitude (Note 3) | NRTC1 | NRTC1 | NRTC1, NRTC3 |
| Time alignment error (Note 3) | NRTC1 | NRTC1 | NRTC1, NRTC3 |
| Occupied bandwidth | SC, NRTC2 (Note 1) | SC, NRTC2 (Note 1) | SC, NRTC2 (Note 1) |
| Adjacent Channel Leakage power Ratio (ACLR) | NRTC1 | NRTC3 | NRTC1, NRTC3 |
| Cumulative ACLR requirement in non-contiguous spectrum | - | NRTC3 | NRTC3 |
| Operating band unwanted emissions | NRTC1, SC (Note 2) NRTC6 (Note 4) | NRTC1, NRTC3, SC (Note 2)NRTC6 (Note 4) | NRTC1, NRTC3, SC (Note 2)NRTC6 (Note 4) |
| Transmitter spurious emissions | NRTC1 |  NRTC3 | NRTC1, NRTC3 |
| Transmitter intermodulation | NRTC1 | NRTC1, NRTC3 | NRTC1, NRTC3 |
| Reference sensitivity level | SC | SC | SC |
| Dynamic range | SC | SC | SC |
| Adjacent Channel Selectivity (ACS) | NRTC1 | NRTC3 | NRTC1, NRTC3 |
| In-band blocking | NRTC1 | NRTC3 | NRTC1, NRTC3 |
| Out-of-band blocking | NRTC1 | NRTC3 | NRTC1, NRTC3 |
| Receiver spurious emissions | NRTC1 | NRTC3 | NRTC1, NRTC3 |
| Receiver intermodulation | NRTC1 | NRTC3 | NRTC1, NRTC3 |
| In-channel selectivity | SC | SC | SC |
| Note 1: NRTC2 is only applicable when contiguous CA is supported.Note 2: OBUE SC shall be tested using the widest supported channel bandwidth and the highest supported sub-carrier spacing.Note 3: There is no specific test for NB-IoT operation in NR in-band for these requirements, tests could be performed using NR signal only, without NB-IoT.Note 4: NRTC6 is only applicable for band n46 and n96 when 60 MHz or 80 MHz channel bandwidth with non-contigous transmission is supported. |

4.8.4 Applicability of test configurations for multi-bandoperation

For a BS declared to be capable of multi-band operation, the test configuration in table 4.8.4-1 and/or table 4.8.3-1 shall be used for testing. In the case where multiple bands are mapped on common *multi-band connector*, the test configuration in the second column of table 4.8.4-1 shall be used. In the case where multiple bands are mapped on common *single-band connector*, the test configuration in table 4.8.3-1 shall be used. In the case where multiple bands are mapped on separate *single-band connector* or *multi-band connector*, the test configuration in the third column of table 4.8.4-1 shall be used.

Unless otherwise stated, single carrier configuration (SC) tests shall be performed using signal with narrowest supported channel bandwidth and the smallest supported sub-carrier spacing.

**Table 4.8.4-1: Test configuration for a BS capable of multi-band operation**

|  |  |
| --- | --- |
| **BS test case** | **Test configuration**  |
|  | **Common connector** | **Separate connectors** |
| Base station output power | NRTC1/3 (Note 1), NRTC4 | NRTC1/3 (Note 1), NRTC4 |
| RE Power control dynamic range | Tested with Error Vector Magnitude | Tested with Error Vector Magnitude |
| Total power dynamic range (Note 8) | SC | SC |
| Transmit ON/OFF power (only applied for NR TDD BS) | NRTC4 | NRTC4  |
| Frequency error | Tested with Error Vector Magnitude | Tested with Error Vector Magnitude |
| Error Vector Magnitude (Note 8) | NRTC1/3 (Note 1), NRTC4 | NRTC1/3 (Note 1), NRTC4 |
| Time alignment error (Note 8) | NRTC1/3 (Note 1), NRTC5 (Note 2) | NRTC1/3 (Note 1), NRTC5 (Note 2) |
| Occupied bandwidth | SC, NRTC2 (Note 3) | SC, NRTC2 (Note 3) |
| Adjacent Channel Leakage power Ratio (ACLR) | NRTC1/3 (Note 1), NRTC5 (Note 4) | NRTC1/3 (Note 1, 5), NRTC5 (Note 4, 5) |
| Cumulative ACLR requirement in non-contiguous spectrum | NRTC3 (Note 1), NRTC5 (Note 4) | NRTC3 (Note 1, 5) |
| Operating band unwanted emissions | NRTC1/3 (Note 1), NRTC5, SC (Note 7) NRTC6 (Note 9) | NRTC1/3 (Note 1, 5), NRTC5 (Note 5),SC(Note 7)NRTC6 (Note 9) |
| Transmitter spurious emissions | NRTC1/3 (Note 1), NRTC5 | NRTC1/3 (Note 1, 5), NRTC5 (Note 5) |
| Transmitter intermodulation | NRTC1/3 (Note 1) | NRTC1/3 (Note 1, 5) |
| Reference sensitivity level | SC | SC |
| Dynamic range | SC | SC |
| Adjacent Channel Selectivity(ACS) | NRTC5 | NRTC1/3 (Note 1), NRTC5 (Note 6) |
| In-band blocking | NRTC5 | NRTC1/3 (Note 1), NRTC5 (Note 6) |
| Out-of-band blocking | NRTC5 | NRTC1/3 (Note 1), NRTC5 (Note 6) |
| Receiver spurious emissions | NRTC1/3 (Note 1), NRTC5 | NRTC1/3 (Note 1, 5), NRTC5 (Note 5) |
| Receiver intermodulation | NRTC5 | NRTC1/3 (Note 1), NRTC5 (Note 6) |
| In-channel selectivity | SC | SC |
| Note 1: NRTC1 and/or NRTC3 shall be applied in each supported operating band.Note 2: NRTC5 is only applicable when inter-band CA is supported.Note 3: NRTC2 is only applicable when contiguous CA is supported.Note 4: NRTC5 may be applied for Inter RF Bandwidth gap only.Note 5: For single-band operation test, other antenna connector(s) is (are) terminated.Note 6: NRTC5 is only applicable for multi-band receiver.Note 7: OBUE SC shall be tested using the widest supported channel bandwidth and the highest supported sub-carrier spacing.Note 8: There is no specific test for NB-IoT operation in NR in-band for these requirements, tests could be performed using NR signal only, without NB-IoT.Note 9: NRTC6 is only applicable for band n46 and n96 when 60 MHz or 80 MHz channel bandwidth with non-contigous transmission is supported. |

4.9 RF channels and test models

## **<End of Change 5>**

## **<Start of Change 6>**

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 – 3530MHz3720MHz – 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. |

The following requirement may apply to BS operating in 3.45-3.55 GHz in Band n77 in certain regions. Emissions shall not exceed the maximum levels specified in table 6.6.5.5.1.3-11.

**Table 6.6.5.5.1.3-11: Additional BS spurious emissions limits for Band n77**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Channel bandwidth [MHz]** | **Frequency range [MHz]** | **Filter centre frequency, Ffilter [MHz]** | **Minimum requirement [dBm]** | ***Measurement bandwidth* [MHz]** |
| All | 3430 – 34403560 – 3570 | 3430.5 ≤ Ffilter < 3439.53560.5 ≤ Ffilter < 3569.5 | -25 | 1 |
| All | ≤ 3430> 3570 | Ffilter < 3429.53570.5 ≤ Ffilter | -40 | 1 |

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.

6.6.5.5.1.4 Co-location with other base stations

## **<End of Change 6>**

## **<Start of Change 7>**

### 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, 3) | -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, 3) | -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, 3) | -89.2 |
| 60 | 30 | G-FR1-A1-18 (Note 2) | -90.9 |
| 60 | G-FR1-A1-6 (Note 1, 3) | -89.2 |
| 80 | 30 | G-FR1-A1-19 (Note 2) | -89.6 |
| 60 | G-FR1-A1-6 (Note 1, 3) | -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 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, except for one instance that might overlap one other instance to cover the full *BS channel bandwidth*.NOTE 3: For 60kHz SCS reference measurement channel is reused from Table 7.2.5-2. |

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, 3) | -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, 3) | -88.2 |
| 60 | 30 | G-FR1-A1-18 (Note 2) | -89.9 |
| 60 | G-FR1-A1-6 (Note 1, 3) | -88.2 |
| 80 | 30 | G-FR1-A1-19 (Note 2) | -88.6 |
| 60 | G-FR1-A1-6 (Note 1, 3) | -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 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, except for one instance that might overlap one other instance to cover the full *BS channel bandwidth*.NOTE 3: For 60kHz SCS reference measurement channel is reused from Table 7.2.5-2. |

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 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, 3) | -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, 3) | -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, 3) | -86.2 |
| 60 | 30 | G-FR1-A1-18 (Note 2) | -87.9 |
|  | 60 | G-FR1-A1-6 (Note 1, 3) | -86.2 |
| 80 | 30 | G-FR1-A1-19 (Note 2) | -86.6 |
|  | 60 | G-FR1-A1-6 (Note 1, 3) | -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 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, except for one instance that might overlap one other instance to cover the full *BS channel bandwidth*.NOTE 3: For 60kHz SCS reference measurement channel is reused from Table 7.2.5-3. |

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, 3) | -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, 3) | -85.2 |
| 60 | 30 | G-FR1-A1-18 (Note 2) | -86.9 |
|  | 60 | G-FR1-A1-6 (Note 1, 3) | -85.2 |
| 80 | 30 | G-FR1-A1-19 (Note 2) | -85.6 |
|  | 60 | G-FR1-A1-6 (Note 1, 3) | -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 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, except for one instance that might overlap one other instance to cover the full *BS channel bandwidth*.NOTE 3: For 60kHz SCS reference measurement channel is reused from Table 7.2.5-3. |

## 7.3 Dynamic range

## **<End of Change 7>**

## **<Start of Change 8>**

### 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(Note 2) | -72.5 | -74.3  | AWGN |
|  | 30 | G-FR1-A2-8(Note 2) | -70.3 |
|  | 60 | G-FR1-A2-3(Note 1, 3) | -63.1 |
| 20 | 15 | G-FR1-A2-9(Note 2) | -69.5 | -71.2  | AWGN |
|  | 30 | G-FR1-A2-10(Note 2) | -66.5 |
|  | 60 | G-FR1-A2-6(Note 1, 3) | -59.5 |
| 40 | 15 | G-FR1-A2-11(Note 2) | -66.4 | -68.1  | AWGN |
|  | 30 | G-FR1-A2-12(Note 2) | -63.4 |
|  | 60 | G-FR1-A2-6(Note 1, 3) | -59.5 |
| 60 | 30 | G-FR1-A2-13(Note 2) | -61.6 | -66.3  | AWGN |
|  | 60 | G-FR1-A2-6(Note 1, 3) | -59.5 |
| 80 | 30 | G-FR1-A2-14(Note 2) | -60.4 | -65.1  | AWGN |
|  | 60 | G-FR1-A2-6(Note 1, 3) | -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: 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, except for one instance that might overlap one other instance to cover the full *BS channel bandwidth*.NOTE 3: For 60kHz SCS reference measurement channel is reused from Table 7.3.5-2. |

**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(Note 2) | -68.5 | -70.2  | AWGN |
|  | 30 | G-FR1-A2-10(Note 2) | -65.5 |  |  |
|  | 60 | G-FR1-A2-6(Note 1, 3) | -58.5 |  |  |
| 40 | 15 | G-FR1-A2-11(Note 2) | -65.4 | -67.1  | AWGN |
|  | 30 | G-FR1-A2-12(Note 2) | -62.4 |  |  |
|  | 60 | G-FR1-A2-6(Note 1, 3) | -58.5 |  |  |
| 60 | 30 | G-FR1-A2-13(Note 2) | -60.6 | -65.3  | AWGN |
|  | 60 | G-FR1-A2-6(Note 1, 3) | -58.5 |  |  |
| 80 | 30 | G-FR1-A2-14(Note 2) | -59.4 | -64.1  | AWGN |
|  | 60 | G-FR1-A2-6(Note 1, 3) | -58.5 |  |  |
| 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: 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, except for one instance that might overlap one other instance to cover the full *BS channel bandwidth*.NOTE 3: For 60kHz SCS reference measurement channel is reused from Table 7.3.5-2. |

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(Note 2) | -69.5 | -71.3  | AWGN |
|  | 30 | G-FR1-A2-8(Note 2) | -67.3 |  |  |
|  | 60 | G-FR1-A2-3(Note 1, 3)  | -60.1 |  |  |
| 20 | 15 | G-FR1-A2-9(Note 2) | -66.5 | -68.2  | AWGN |
|  | 30 | G-FR1-A2-10(Note 2) | -63.5 |  |  |
|  | 60 | G-FR1-A2-6(Note 1, 3) | -56.5 |  |  |
| 40 | 15 | G-FR1-A2-11(Note 2) | -63.4 | -65.1  | AWGN |
|  | 30 | G-FR1-A2-12(Note 2) | -60.4 |  |  |
|  | 60 | G-FR1-A2-6(Note 1, 3) | -56.5 |  |  |
| 60 | 30 | G-FR1-A2-13(Note 2) | -58.6 | -63.3  | AWGN |
|  | 60 | G-FR1-A2-6(Note 1, 3) | -56.5 |  |  |
| 80 | 30 | G-FR1-A2-14(Note 2) | -57.4 | -62.1  | AWGN |
|  | 60 | G-FR1-A2-6(Note 1, 3) | -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 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 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, except for one instance that might overlap one other instance to cover the full *BS channel bandwidth*.NOTE 3: For 60kHz SCS reference measurement channel is reused from Table 7.3.5-2. |

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(Note 2) | -65.5 | -67.2  | AWGN |
|  | 30 | G-FR1-A2-10(Note 2) | -62.5 |  |  |
|  | 60 | G-FR1-A2-6(Note 1, 3) | -55.5 |  |  |
| 40 | 15 | G-FR1-A2-11(Note 2) | -62.4 | -64.1  | AWGN |
|  | 30 | G-FR1-A2-12(Note 2) | -59.4 |  |  |
|  | 60 | G-FR1-A2-6(Note 1, 3) | -55.5 |  |  |
| 60 | 30 | G-FR1-A2-13(Note 2) | -57.6 | -62.3  | AWGN |
|  | 60 | G-FR1-A2-6(Note 1, 3) | -55.5 |  |  |
| 80 | 30 | G-FR1-A2-14(Note 2) | -56.4 | -61.1  | AWGN |
|  | 60 | G-FR1-A2-6(Note 1, 3) | -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 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 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, except for one instance that might overlap one other instance to cover the full *BS channel bandwidth*.NOTE 3: For 60kHz SCS reference measurement channel is reused from Table 7.3.5-2. |

## 7.4 In-band selectivity and blocking

## **<End of Change 8>**