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**3GPP TS 38.141-1**

V15.3.0 (2019-09)

Base Station(BS) coformance testing

Part 1: Conducted conformance testing

(Release 15)

**Detailed Revision History**

|  |  |  |  |
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| 0.1 | 29-NOV-2019 | Sang-Gu Kang | Initial Draft |
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# Scope

본 문서는 무선 주파수 (RF) 테스트 방법 및 NR 기지국 (BS) Type 1-C 및 Type 1-H에 대한 적합성 요구 사항을 지정합니다. 이는 TS 38.104 [2]에 정의 된 NR BS 사양의 BS Type 1-C 및 BS Type 1-H에 대해 수행 된 요구 사항과 일치합니다.

BS Type 1-C는 전도 요구 사항만 가지고 있으므로 이 규격만 준수하면됩니다.

BS Type 1-H는 전도 및 방사 요구 사항을 모두 가지고 있으므로이 규격 및 TS 38.141-2의 해당 요구 사항을 준수해야합니다 [3].

BS Type 1-O 및 BS Type 2-O는 방사 요구 사항 만 있으므로 TS 38.141-2 [3] 만 준수하면됩니다.

# References

|  |  |
| --- | --- |
| [1] | 3GPP TR 21.905: “Vocabulary for 3GPP Specifications” |
| [2] | 3GPP TS 38.104: “NR Base Station (BS) radio transmission and reception” |
| [3] | 3GPP TS 38.141-2: “NR, Base Station (BS) conformance testing, Part 2: Radiated conformance testing” |
| [4] | ITU-R Recommendation M.1545, "Measurement uncertainty as it applies to test limits for the terrestrial component of International Mobile Telecommunications-2000" |
| [5] | ITU-R Recommendation SM.329: "Unwanted emissions in the spurious domain" |
| [6] | IEC 60 721-3-3: "Classification of environmental conditions - Part 3-3: Classification of groups of environmental parameters and their severities - Stationary use at weather protected locations" |
| [7] | IEC 60 721-3-4: "Classification of environmental conditions - Part 3: Classification of groups of environmental parameters and their severities - Section 4: Stationary use at non-weather protected locations" |
| [8] | IEC 60 721: "Classification of environmental conditions" |
| [9] | IEC 60 068-2-1 (2007): "Environmental testing - Part 2: Tests. Tests A: Cold" |
| [10] | IEC 60 068-2-2: (2007): "Environmental testing - Part 2: Tests. Tests B: Dry heat" |
| [11] | IEC 60 068-2-6: (2007): "Environmental testing - Part 2: Tests - Test Fc: Vibration (sinusoidal)" |
| [12] | ITU-R Recommendation SM.328: "Spectra and bandwidth of emissions" |
| [13] | Federal Communications Commission: "Title 47 of the Code of Federal Regulations (CFR)" |
| [14] | ECC/DEC/(17)06: "The harmonised use of the frequency bands 1427-1452 MHz and 1492-1518 MHz for Mobile/Fixed Communications Networks Supplemental Downlink (MFCN SDL)" |
| [15] | 3GPP TR 25.942: "RF system scenarios" |
| [16] | 3GPP TS 38.212: "NR; Multiplexing and channel coding" |
| [17] | 3GPP TS 38.211: "NR; Physical channels and modulation" |
| [18] | 3GPP TS 38.214: "NR; Physical layer procedures for data" |
| [19] | 3GPP TS 38.331: "NR; Radio Resource Control (RRC) protocol specification" |
| [20] | 3GPP TR 38.901: "Study on channel model for frequencies from 0.5 to 100 GHz" |
| [21] | 3GPP TS 38.101-1: "NR; User Equipment (UE) radio transmission and reception; Part 1: Range 1 Standalone" |
| [22] | 3GPP TS 36.104: "Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) radio transmission and reception" |

# Definitions, symbols and abbreviations

## Definitions

**aggregated BS channel bandwidth**: the RF bandwidth in which a Base Station transmits and receives multiple contiguously aggregated carriers. The aggregated BS channel bandwidth is measured in MHz

**antenna connector**: connector at the conducted interface of the BS type 1-C

**active transmitter unit**: transmitter unit which is ON, and has the ability to send modulated data streams that are parallel and distinct to those sent from other transmitter units to a BS type 1-C antenna connector, or to one or more BS type 1-H TAB connectors at the transceiver array boundary

**Base Station RF Bandwidth**: RF bandwidth in which a base station transmits and/or receives single or multiple carrier(s) within a supported operating band  
NOTE: In single carrier operation, the Base Station RF Bandwidth is equal to the BS channel bandwidth.

**Base Station RF Bandwidth edge**: frequency of one of the edges of the Base Station RF Bandwidth

**basic limit**: emissions limit relating to the power supplied by a single transmitter to a single antenna transmission line in ITU-R SM.329 [5] used for the formulation of unwanted emission requirements for FR1

**BS channel bandwidth**: RF bandwidth supporting a single NR RF carrier with the transmission bandwidth configured in the uplink or downlink  
NOTE 1: The BS channel bandwidth is measured in MHz and is used as a reference for transmitter and receiver RF requirements.  
NOTE 2: It is possible for the BS to transmit to and/or receive from one or more UE bandwidth parts that are smaller than or equal to the BS transmission bandwidth configuration, in any part of the BS transmission bandwidth configuration.

**BS type 1-C**: NR base station operating at FR1 with requirements set consisting only of conducted requirements defined at individual antenna connectors

**BS type 1-H**: NR base station operating at FR1 with a requirement set consisting of conducted requirements defined at individual TAB connectors and OTA requirements defined at RIB

**BS type 1-O**: NR base station operating at FR1 with a requirement set consisting only of OTA requirements defined at the RIB  
NOTE: BS type 1-O conformance requirements are captured in TS 38.141-2 [3] and are out of scope of this specification.

**BS type 2-O**: NR base station operating at FR2 with a requirement set consisting only of OTA requirements defined at the RIB  
NOTE: BS type 2-O conformance requirements are captured in TS 38.141-2 [3] and are out of scope of this specification.

**channel edge**: lowest or highest frequency of the NR carrier, separated by the BS channel bandwidth

**carrier aggregation**: aggregation of two or more component carriers in order to support wider transmission bandwidths

**carrier aggregation configuration**: a set of one or more operating bands across which the BS aggregates carriers with a specific set of technical requirements

**contiguous carriers**: set of two or more carriers configured in a spectrum block where there are no RF requirements based on co-existence for un-coordinated operation within the spectrum block

**contiguous spectrum**: spectrum consisting of a contiguous block of spectrum with no sub-block gap(s)

**highest carrier**: The carrier with the highest carrier frequency transmitted/received in a specified frequency band

**inter-band carrier aggregation**: carrier aggregation of component carriers in different operating bands  
NOTE: Carriers aggregated in each band can be contiguous or non-contiguous.

**Inter-band gap**: The frequency gap between two supported consecutive operating bands

**intra-band contiguous carrier aggregation**: contiguous carriers aggregated in the same operating band

**intra-band non-contiguous carrier aggregation**: non-contiguous carriers aggregated in the same operating band

**Inter RF Bandwidth gap**: frequency gap between two consecutive Base Station RF Bandwidths that are placed within two supported operating bands

**lowest carrier**: the carrier with the lowest carrier frequency transmitted/received in a specified frequency band

**lower sub-block edge**: frequency at the lower edge of one sub-block  
NOTE: It is used as a frequency reference point for both transmitter and receiver requirements.

**maximum carrier output power**: mean power level measured per carrier at the indicated interface, during the transmitter ON period in a specified reference condition

**maximum total output power**: mean power level measured within the operating band at the indicated interface, during the transmitter ON period in a specified reference condition

**measurement bandwidth**: RF bandwidth in which an emission level is specified

**multi-band connector**: antenna connector of the BS type 1-C or TAB connector of the BS type 1-H associated with a transmitter or receiver that is characterized by the ability to process two or more carriers in common active RF components simultaneously, where at least one carrier is configured at a different operating band than the other carrier(s) and where this different operating band is not a sub-band or superseding-band of another supported operating band

**multi-carrier transmission configuration**: set of one or more contiguous or non-contiguous carriers that a BS is able to transmit simultaneously according to the manufacturer's specification

**non-contiguous spectrum**: spectrum consisting of two or more sub-blocks separated by sub-block gap(s)

**operating band**: frequency range in which NR operates (paired or unpaired), that is defined with a specific set of technical requirements  
NOTE: The operating band(s) for a BS is declared by the manufacturer according to the designations in TS 38.104 [2], tables 5.2-1 and 5.2-2.

**Radio Bandwidth**: frequency difference between the upper edge of the highest used carrier and the lower edge of the lowest used carrier

**rated carrier output power**: mean power level associated with a particular carrier the manufacturer has declared to be available at the indicated interface, during the transmitter ON period in a specified reference condition

**rated total output power**: mean power level associated with a particular operating band the manufacturer has declared to be available at the indicated interface, during the transmitter ON period in a specified reference condition

**requirement set**: one of the NR base station requirement's set as defined for BS type 1-C, BS type 1-H, BS type 1-O, and BS type 2-O

**single-band connector**: antenna connector of the BS type 1-C or TAB connector of the BS type 1-H supporting operation either in a single operating band only, or in multiple operating bands but does not meet the conditions for a multi-band connector

**sub-band**: sub-band of an operating band contains a part of the uplink and downlink frequency range of the operating band

**sub-block**: one contiguous allocated block of spectrum for transmission and reception by the same base station  
NOTE: There may be multiple instances of sub-blocks within a Base Station RF Bandwidth.

**sub-block gap**: frequency gap between two consecutive sub-blocks within a Base Station RF Bandwidth, where the RF requirements in the gap are based on co-existence for un-coordinated operation

**superseding-band**: superseding-band of an operating band includes the whole of the uplink and downlink frequency range of the operating band

**TAB connector**: transceiver array boundary connector

**TAB connector RX min cell group**: operating band specific declared group of TAB connectors to which BS type 1-H conducted RX requirements are applied  
NOTE: Within this definition, the group corresponds to the group of TAB connectors which are responsible for receiving a cell when the BS type 1-H setting corresponding to the declared minimum number of cells with reception on all TAB connectors supporting an operating band, but its existence is not limited to that condition

**TAB connector TX min cell group**: operating band specific declared group of TAB connectors to which BS type 1-H conducted TX requirements are applied  
NOTE: Within this definition, the group corresponds to the group of TAB connectors which are responsible for transmitting a cell when the BS type 1-H setting corresponding to the declared minimum number of cells with transmission on all TAB connectors supporting an operating band, but its existence is not limited to that condition

**total RF bandwidth**: maximum sum of Base Station RF Bandwidths in all supported operating bands

**transceiver array boundary**: conducted interface between the transceiver unit array and the composite antenna

**transmitter OFF period**: time period during which the BS transmitter is not allowed to transmit

**transmitter ON period**: time period during which the BS transmitter is transmitting data and/or reference symbols

**transmitter transient period**: time period during which the transmitter is changing from the OFF period to the ON period or vice versa

**upper sub-block edge**: frequency at the upper edge of one sub-block  
NOTE: It is used as a frequency reference point for both transmitter and receiver requirements.

## Symbols

|  |  |
| --- | --- |
| β | 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 = NRB x SCS x 12kHz |
| BWtot | Total RF bandwidth |
| ∆f | Separation between the channel edge frequency and the nominal -3 dB point of the measuring filter closest to the carrier frequency |
| ∆fmax | f\_offsetmax minus half of the bandwidth of the measuring filter |
| ∆FGlobal | Global frequency raster granularity |
| ∆FOBUE | Maximum offset of the operating band unwanted emissions mask from the downlink operating band edge |
| ∆fOOB | Maximum offset of the out-of-band boundary from the uplink operating band edge |
| ∆FRaster | Channel raster granularity |
| ∆SUL | Channel raster offset for SUL |
| FC | RF reference frequency on the channel raster |
| FC\_block\_high |  |
| FC\_block\_low |  |
| FC\_low |  |
| FC\_high |  |
| Fedge\_low |  |
| Fedge\_high |  |
| Fedge\_block\_low |  |
| Fedge\_block\_high |  |
| Foffset\_high |  |
| Foffset\_low |  |
| FDL\_low |  |
| FDL\_high |  |
| f\_offset |  |
| F\_offsetmax |  |
| FREF |  |
| FREF\_SUL |  |
| FDL\_low |  |
| FDL\_high |  |
| FUL\_low |  |
| FUL\_high |  |
| Iuant |  |
| Ncells |  |
| NRB |  |
| NREF |  |
| NRXU\_active |  |
| NRXU\_counted |  |
| NRXU\_countedpercell |  |
| NTXU\_counted |  |
| NTXU\_countedpercell |  |
| PEM\_n50\_ind |  |
| Pmax\_c\_AC |  |
| Pmax\_c\_cell |  |
| Pmax\_c\_TABC |  |
| Prated\_c\_AC |  |
| Prated\_c\_sys |  |
| Prated\_c\_TABC |  |
| Prated\_t\_AC |  |
| Prated\_t\_TABC |  |
| PREFSENS |  |
| SSREF |  |
| Wgap |  |

## Abbreviations

|  |  |
| --- | --- |
| AAS | Active Antenna System |
| ACLR | Adjacent Channel Leakage Ratio |
| ACS | Adjacent Channel Selectivity |
| AWGN | Additive White Gaussian Noise |
| BS | Base Station |
| BW | Bandwidth |
| CA | Carrier Aggregation |
| CACLR | Cumulative ACLR |
| CW | Continuous Wave |
| DM-RS | Demodulation Reference Signal |
| E-UTRA | Evolved UTRA |
| EVM | Error Vector Manitude |
| FDD | Frequency Division Duplex |
| FR | Frequency Range |
| GSCN | Global Synchronization Channel Number |
| ICS | In-Channel Selectivity |
| LA | Local Area |
| LNA | Low Noise Amplifier |
| MR | Medium Range |
| NR | New Radio |
| NR-ARFCN | NR Absolute Radio Frequency Channel Number |
| OBUE | Operating Band Unwanted Emissions |
| OTA | Over The Air |
| RDN | Radio Distribution Network |
| REFSENS | Reference Sensitivity |
| RF | Radio Frequency |
| RIB | Radiated Interface Boundary |
| RMS | Root Mean Square (value) |
| RS | Reference Signal |
| RX | Receiver |
| SCS | Sub-Carrier Spacing |
| SDL | Supplementary Downlink |
| SSB | Synchronization Signal Block |
| SUL | Supplementary Uplink |
| TAB | Transceiver Array Boundary |
| TAE | Time Alignment Error |
| TDD | Time Division Duplex |
| TX | Transmitter |

# General conducted test conditions and declarations

## Measurement uncertainties and test requirements

### General

이 절의 요구 사항은이 규격의 1 부에 적용되는 모든 시험, 즉 FR1에 대해 정의 된 모든 시험에 적용된다. 주파수 범위 FR1과 FR2는 TS 38.104 [2]의 5.1에 정의되어있다.

최소 요구 사항은 TS 38.104 [2] 및 그 참조에 제시되어있다. 본 문서에 명시 적으로 언급 된 수행 된 시험 요건에 대한 시험 공차는 본 문서의 annex C에 제공된다.

테스트 허용 오차는 각 테스트마다 개별적으로 계산된다. 테스트 허용 오차는 테스트 요구 사항을 작성하기 위해 최소 요구 사항을 완화하는 데 사용된다.

테스트 요구 사항이 해당 최소 요구 사항과 다른 경우 테스트에 적용된 테스트 허용 오차는 0이 아니다. 시험에 대한 시험 공차 및 시험 공차에 의해 최소 요건이 완화 된 방법에 대한 설명은 annex C에 주어져있다.

### Acceptable uncertainty of Test System

#### General

테스트 시스템의 최대 허용 불확도는 적절한 경우 본 명세서에서 명시 적으로 정의 된 각 테스트에 대해 아래에 명시되어있다. 참조로 포함 된 시험 요구 사항에 대한 시험 시스템의 최대 허용 불확도는 각 참조 시험 규격에 정의되어있다.

TAB 커넥터 당 요구 사항이 적용될 때 BS type 1-H의 경우 테스트 불확실성이 측정 된 값에 적용된다. TAB 커넥터 그룹에 대한 요구 사항이 적용되면 그룹의 각 TAB 커넥터에서 측정 된 전력의 합에 테스트 불확실성이 적용된다.

시험 시스템은 시험 케이스의 자극 신호가 규정 된 허용 오차 내에서 조정될 수 있도록하고 시험중인 장비가 규정 값을 초과하지 않는 불확실성으로 측정 될 수 있도록해야한다. 모든 공차 및 불확실성은 절대 값이며, 달리 명시되지 않는 한 신뢰 수준 95 %에 유효하다.

95 %의 신뢰 수준은 테스트 장비 모집단의 성능의 95 %를 포함하는 특정 측정에 대한 측정 불확실성 공차 구간이다.

RF 테스트의 경우 4.1.2의 불확실성이 공칭 50ohm 부하로 작동하는 테스트 시스템에 적용되며 DUT와 테스트 시스템 간의 불일치로 인한 시스템 영향은 포함되지 않는다.

#### Measurement of transmitter

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

|  |  |  |
| --- | --- | --- |
| **Subclause** | **Maximum Test System Uncertainty** | **Derivation of Test System Uncertainty** |
| 6.2 Base Station output power | ±0.7dB, f ≤ 3GHz  ±1.0dB, 3GHz < f ≤ 6GHz (Note) |  |
| 6.3 Output power dynamics | ±0.4dB |  |
| 6.4.1 Transmit OFF power | ±2.0dB, f ≤ 3GHz  ±2.5dB, 3GHz < f ≤ 6GHz (Note) |  |
| 6.4.2 Transmitter transient period | N/A |  |
| 6.5.2 Frequency error | ±12Hz |  |
| 6.5.3 EVM | ±1% |  |
| 6.5.4 Time alignment error | ±25ns |  |
| 6.6.2 Occupied bandwidth | 5MHz, 10MHz BS Channel BW: ±100kHz  15MHz, 20MHz, 25MHz, 30MHz, 40MHz, 50MHz BS Channel BW: ±300kHz  60MHz, 70MHz, 80MHz, 90MHz, 100MHz BS Channel BW: ±600kHz |  |
| 6.6.3 Adjacent Channel Leakage power Ratio (ACLR) | ACLR / CACLR  BW ≤ 20MHz: ±0.8dB  BW > 20MHz: ±1.2dB  Absolute power ±2.0dB, f ≤ 3GHz  Absolute power ±2.5dB, 3GHz < f ≤ 6GHz (Note)  CACLR  BW ≤ 20MHz: ±0.8dB  BW > 20MHz: ±1.2dB  CACLR absolute power ±2.0dB, f ≤ 3GHz  CACLR absolute power ±2.5dB, 3GHz < f ≤ 6GHz (Note) |  |
| 6.6.4 Operating band unwanted emissions | ±1.5dB, f ≤ 3GHz  ±1.8dB, 3GHz < f ≤ 6GHz (Note) |  |
| 6.6.5.5.1.1 Transmitter spurious emissions, Mandatory Requirements | 9kHz < f ≤ 4GHz: ±2.0dB  4GHz < f ≤ 19GHz: ±4.0dB  19GHz < f ≤ 26GHz: [±4.5dB] |  |
| 6.6.5.5.1.2 Transmitter spurious emissions, Protection of BS receiver | ±3.0dB |  |
| 6.6.5.5.1.3 Transmitter spurious emissions, Additional spurious emission requirements | ±2.0dB for > -60dBm, f ≤ 3GHz  ±2.5dB, 3GHz < f ≤ 4.2GHz  ±3.0dB, 4.2GHz < f ≤ 6GHz  ±3.0dB for ≤ -60dBm, f ≤ 3GHz  ±3.5dB, 3GHz < f ≤ 4.2GHz  ±4.0dB, 4.2GHz < f ≤ 6GHz |  |
| 6.6.5.2.4 Transmitter spurious emissions, Co-location | ±3.0dB |  |
| 6.7 Transmitter intermodulation (interfere requirements)  This tolerance applies to the stimulus and not the measurements defined in | The value below applies only to the interfering signal and is unrelated to the measurement uncertainty of the tests (6.6.1, 6.6.2 and 6.6.4) which have to be carried out in the presence of the interferer. | 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. | | |

#### Measurement of receiver

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

|  |  |  |
| --- | --- | --- |
| **Subclause** | **Maximum Test System Uncertainty** | **Derivation of Test System Uncertainty** |
| 7.2 Reference sensitivity level | ±0.7dB, f ≤ 3GHz  ±1.0dB, 3GHz < f ≤ 4.2GHz  ±1.2dB, 4.2GH < f ≤ 6GHz |  |
| 7.3 Dynamic range | ±0.3dB |  |
| 7.4.1 Adjacent channel selectivity | ±1.4dB, f ≤ 3GHz  ±1.8dB, 3GHz < f ≤ 4.2GHz  ±2.1dB, 4.2GHz < f ≤ 6GHz (Note 2) | 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 ≤ 3GHz  Wanted signal level ±0.7dB  Interferer signal level ±0.7dB  3GHz < f ≤ 4.2GHz  Wanted signal level ±1.0dB  Interferer signal level ±1.0dB  4.2GHz < f ≤ 6GHz  Wanted signal level ±1.22dB  Interferer signal level ±1.22dB  f ≤ 6GHz  Impact of interferer leakage 0.4dB |
| 7.4.2.4.2 In-band blocking (General blocking) | ±1.6dB, f ≤ 3GHz  ±2.0dB, 3GHz < f ≤ 4.2GHz  ±2.2dB, 4.2GHz < f ≤ 6GHz (Note 2) |  |
| 7.4.2.4.3 In-band blocking (Narrow band blocking) | ±1.4dB, f ≤ 3GHz  ±1.8dB, 3GHz < f ≤ 4.2GHz  ±2.1dB, 4.2GHz < f ≤ 6GHz (Note 2) |  |
| 7.5.5.1 Out-of-band blocking (General requirements) | fwanted ≤ 3GHz  1MHz < finterferer ≤ 3GHz: ±1.3dB  3.0GHz < finterferer ≤ 4.2GHz: ±1.5dB  4.2GHz < finterferer ≤ 12.75GHz: ±3.2dB  3GHz < fwanted ≤ 4.2GHz  1MHz < finterferer ≤ 3GHz: ±1.5dB  3.0GHz < finterferer ≤ 4.2GHz: ±1.7dB  4.2GHz < finterferer ≤ 12.75GHz: ±3.3dB  4.2GHz < fwanted ≤ 6.0GHz  1MHz < finterferer ≤ 3GHz: ±1.7dB  3.0GHz < finterferer ≤ 4.2GHz: ±1.8dB  4.2GHz < finterferer ≤ 12.75GHz: ±3.3dB | 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:  ±0.7dB up to 3GHz  ±1.0dB up to 4.2GHz  ±1.22dB up to 6GHz  Interferer signal level:  ±1.0dB up to 3GHz  ±1.2dB up to 4.2GHz  ±3.0dB up to 12.75GHz  Impact of interferer Broadband noise 0.1dB |
| 7.5.5.2 Out-of-band blocking (Co-location requirements) | Co-location blocking, using CW interferer:  ±2.5dB, f ≤ 3.0GHz  ±2.6dB, 3.0GHz < f ≤ 4.2GHz  ±2.7dB, 4.2GHz < f ≤ 6.0GHz | Co-location blocking, using CW interferer:  f ≤ 3.0GHz  Wanted signal level ±0.7dB  3.0GHz < f ≤ 4.2GHz  Wanted signal level ±1.0dB  4.2GHz < f ≤ 6.0GHz  Wanted signal level ±1.22dB  f ≤ 6.0GHz  Interferer signal level:  ±2.0dB  Interferer ACLR not applicable  Impact of interferer Broadband noise 0.4dB |
| 7.6 Receiver spurious emissions | 30MHz ≤ f ≤ 4GHz: ±2.0dB  4GHz < f ≤ 19GHz: ±4.0dB  19GHz < f ≤ 26GHz: [±4.5dB] |  |
| 7.7 Receiver intermodulation | ±1.8dB, f ≤ 3.0GHz  ±2.4dB, 3.0GHz < f ≤ 4.2GHz  ±3.0dB, 4.2GHz < f ≤ 6.0GHz (Note 2) | 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 ≤ 3.0GHz  Wanted signal level ±0.7dB  CW interferer level ±0.5dB  Mod interferer level ±0.7dB  3.0GHz < f ≤ 4.2GHz  Wanted signal level ±1.0dB  CW interferer level ±0.7dB  Mod interferer level ±1.0dB  4.2GHz < f ≤ 6GHz  Wanted signal level ±1.22dB  CW interferer level ±0.98dB  Mod interferer level ±1.22dB  f ≤ 6GHz  Impact of interferer ACLR 0.4dB |
| 7.8 In-channel selectivity | ±1.4dB, f < 3GHz  ±1.8dB, 3GHz < f ≤ 4.2GHz  ±2.1dB, 4.2GHz < f ≤ 6.0GHz (Note 2) |  |
| 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. | | |

#### Measurement of performance requirements

**Table 4.1.2.4-1: Maximum Test System Uncertainty for performance requirements**

|  |  |  |
| --- | --- | --- |
| **Subclause** | **Maximum Test System Uncertainty** | **Derivation of Test System Uncertainty** |
| 8 PUSCH, PUCCH, PRACH with single antenna port and fading channel | ±0.6dB | Overall system uncertainty for fading conditions comprises two quantities:  1. Signal-to-noise ratio uncertainty  2. Fading profile power uncertainty  Items 1 and 2 are assumed to be uncorrelated so can be root sum squared:  Test System uncertainty = [SQRT(Signal-to-noise ratio uncertainty2 + Fading profile power uncertainty2)]  Signal-to-noise ratio uncertainty ±0.3dB  Fading profile power uncertainty ±0.5dB |
| 8 PRACH with single antenna port and AWGN | ±0.3dB | Signal-to-noise ratio uncertainty ±0.3dB |
| 8 PUSCH with two antenna port and fading channel | ±0.8dB | Overall system uncertainty for fading conditions comprises two quantities:  1. Signal-to-noise ratio uncertainty  2. Fading profile power uncertainty  Items 1 and 2 are assumed to be uncorrelated so can be root sum squared:  Test System uncertainty = [SQRT(Signal-to-noise ratio uncertainty2 + Fading profile power uncertainty2)]  Signal-to-noise ratio uncertainty ±0.3dB  Fading profile power uncertainty ±0.7dB for MIMO |

### Interpretation of measurement results

The measurement results returned by the Test System are compared - without any modification - against the test requirements as defined by the Shared Risk principle.

The Shared Risk principle is defined in Recommendation ITU-R M.1545 [4].

The actual measurement uncertainty of the Test System for the measurement of each parameter shall be included in the test report.

The recorded value for the Test System uncertainty shall be, for each measurement, equal to or lower than the appropriate figure in subclause 4.1.2 of the present document.

If the Test System for a test is known to have a measurement uncertainty greater than that specified in subclause 4.1.2, it is still permitted to use this apparatus provided that an adjustment is made as follows.

Any additional uncertainty in the Test System over and above that specified in subclause 4.1.2 shall be used to tighten the test requirement, making the test harder to pass. For some tests e.g. receiver tests, this may require modification of stimulus signals. This procedure will ensure that a Test System not compliant with subclause 4.1.2 does not increase the chance of passing a device under test where that device would otherwise have failed the test if a Test System compliant with subclause 4.1.2 had been used.

## Conducted requirement reference points

### BS type 1-C

BS type 1-C 요구 사항은 정상적인 작동 조건에서 구성 할 수있는 트랜시버의 전체 보완 기능을 갖춘 단일 송신기 또는 수신기의 BS 안테나 커넥터 (포트 A)에 적용된다. 증폭기, 필터 또는 이러한 장치의 조합과 같은 외부 장치를 사용하는 경우에는 far end antenna 커넥터 (포트 B)에 요구 사항이 적용된다.



**Figure 4.2.1-1: BS type 1-C transmitter interface**



**Figure 4.2.1-2: BS type 1-C receiver interface**

### BS type 1-H

BS type 1-H 요구 사항은 방사 요구 사항과 전도 요구 사항으로 표시되는 두 가지 기준점에 대해 정의된다.



**Figure 4.2.2-1: Radiated and conducted reference points for BS type 1-H**

방사 특성은 무선 (OTA)을 통해 정의되며, 작동 대역 별 방사 인터페이스는 방사 인터페이스 경계 (RIB)라고 한다. 방사 요구 사항은 OTA 요구 사항이라고도 한다. OTA 요구 사항이 적용되는 (공간) 특성은 각 요구 사항에 대해 자세히 설명되어 있다.  
NOTE: 방사 적합성 요구 사항은 TS 38.141-2 [3]에 기술되어 있으며이 규격의 범위를 벗어난다.

전도 특성은 트랜시버 배열 및 개별 안테나 사이의 전도 인터페이스 인 트랜시버 배열 경계에서 TAB 커넥터의 개별 또는 그룹에서 정의된다.

트랜시버 유닛 어레이는 변조 된 송신 신호 구조를 생성하고 수신기 결합 및 복조를 수행하는 복합 트랜시버 기능의 일부이다.

트랜시버 유닛 어레이는 구현 특정 개수의 송신기 유닛 및 구현 특정 개수의 수신기 유닛을 포함한다. 송신기 유닛 및 수신기 유닛은 트랜시버 유닛으로 결합 될 수있다. 송신기 / 수신기 유닛은 병렬 독립 변조된 심볼 스트림을 전송 / 수신하는 능력을 갖는다.

복합 안테나에는 RDN (Radio Distribution Network) 및 안테나 배열이 포함되어 있다. RDN은 구현 특정 방식으로, 트랜시버 유닛 어레이에 의해 생성된 RF 전력을 안테나 어레이에 분배하거나 안테나 어레이에 의해 수집된 무선 신호를 트랜시버 유닛 어레이에 분배하는 선형 수동 네트워크이다.

수행 된 요구 사항이 트랜시버 어레이 경계에 적용되는 방법은 해당 요구 사항 하위 절에 자세히 설명되어 있다.

## Base station classes

BS 타입 1-C 및 1-H의 BS 클래스는 다음과 같이 정의된다.

* 광대역 기지국은 BS 대 UE 최소 커플 링 손실이 70dB 인 매크로 셀 시나리오에서 파생 된 요구 사항으로 특징 지어진다.
* 중거리 기지국은 BS 대 UE 최소 커플 링 손실이 53dB 인 마이크로 셀 시나리오에서 파생 된 요구 사항으로 특징 지어진다.
* 근거리 기지국은 45 dB에 해당하는 BS에서 최소 커플 링 손실을 갖는 Pico Cell 시나리오에서 파생 된 요구 사항으로 특징 지어진다.

## Regional requirements

표 4.4-1은 본 명세서에서 다른 영역에서 다르게 적용될 수있는 모든 요구 사항을 열거한다.

|  |  |  |
| --- | --- | --- |
| **Clause number** | **Requirement** | **Comments** |
| 5 | Operating bands | 일부 NR 작동 대역은 지역별로 적용될 수 있다. |
| 6.6.2 | Occupied bandwidth | 요구 사항은 지역별로 적용될 수 있다. 본 명세서의 정의에 따라 점유 대역폭을 선언하기위한 지역 요구 사항이있을 수도 있다. |
| 6.6.4.5 | Operating band unwanted emission | Category A 또는 Category B 작동 대역 원치않는 방출 제한은 지역적으로 적용될 수 있다. |
| 6.6.4.5.6.1 | Operating band unwanted emissions:  Limits in FCC Title 47 | BS는 이러한 제한이 적용되는 지역에 배치 될 때 제조업체가 선언한 조건에 따라 추가 요구 사항을 준수해야 할 수도 있다. |
| 6.6.4.5.6.2 | Operating band unwanted emission  Protection of DTT | Band n20에서 동작하는 BS는 특정 지역에 배치 될 때 DTT 보호를위한 추가 요구 사항을 준수해야 할 수도 있다. |
| 6.6.5.5.1.1 | Transmitter spurious emissions | ITU-R 권고 SM.329 [5]에 정의된 Category A 또는 Category B 스퓨리어스 방출 한계는 지역적으로 적용될 수 있다.  Basic limit + X (dB)로 지정된 BS type 1-H의 배출 제한은 지역 규정에서 다르게 명시되지 않는 한 적용 가능하다. |
| 6.6.5.5.1.3 | Transmitter spurious emissions: additional requirements | 이러한 요구 사항들은 BS 동작 대역 이외의 주파수 범위에서 동작하는 시스템의 보호를 위해 적용될 수 있다. |
| 6.7.5.1.1,  6.7.5.2.1 | Transmitter intermodulation | 기지국의 다운 링크 동작 대역의 일부 또는 완전히 외부에있는 간섭 신호 위치는 Band n77, n78, n79의 일본 요건에서 제외되지 않는다. |
| 7.6.5.3 | Receiver spurious emissions | Basic limt + X (dB)로 지정된 BS type 1-H의 배출 제한은 지역 규정에서 다르게 명시되지 않는 한 적용 가능하다. |

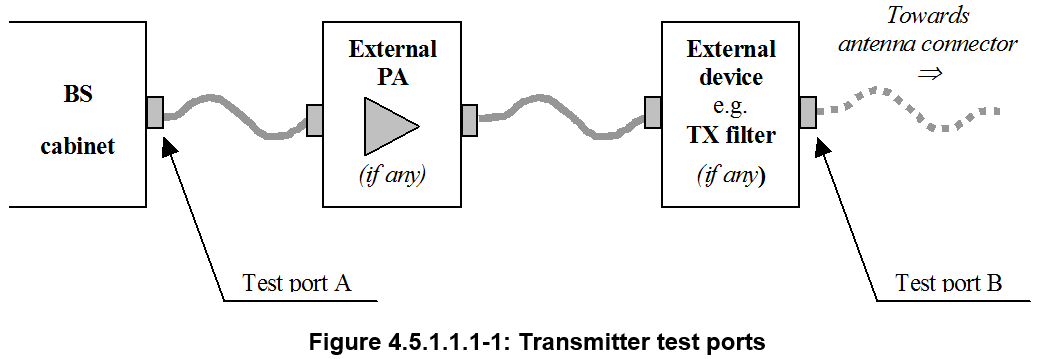
## BS configurations

### BS type 1-C

#### Transmit configurations

##### General

달리 명시되지 않는 한, 6절의 송신기 특성은 정상적인 작동 조건에서의 구성을 위한 트랜시버의 전체 보완 기능을 갖춘 BS 안테나 커넥터 (test port A)에 지정된다. TX 앰프, 필터 또는 이러한 장치의 조합과 같은 외부 장치를 사용하는 경우에는 파 엔드 안테나 커넥터 (테스트 포트 B)에 요구 사항이 적용됩니다.



##### Transmission with multiple transmitter antenna connectors

달리 언급되지 않는 한, 본 문서의 6절에있는 시험에 대하여, 다수의 송신기 안테나 커넥터로 전송하는 경우 각 송신기 안테나 커넥터에 대한 요구 사항이 적용된다.  
송신기 요구 사항은 안테나 커넥터에서 테스트되며 나머지 안테나 커넥터는 종료(being terminated)된다. 제조업체가 송신기 경로를 동등한 것으로 선언 한 경우 (D.32) 송신기 안테나 커넥터 중 하나에서 신호를 측정하는 것으로 충분하다.

#### Receive configurations