# Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

The present document is one part of a multi-part Technical Specification (TS) covering the New Radio (NR) User Equipment (UE) conformance specification, which is divided in the following parts:

- 3GPP TS 38.521-1: " NR; User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: Range 1 Standalone" (the present document).

- 3GPP TS 38.521-2 [13]: " NR; User Equipment (UE) conformance specification; Radio transmission and reception; Part 2: Range 2 Standalone".

- 3GPP TS 38.521-3 [14]: “NR; User Equipment (UE) conformance specification; Radio transmission and reception; Part 3: Range 1 and Range 2 Interworking operation with other radios”

- 3GPP TS 38.521-4 [15]: “NR; User Equipment (UE) conformance specification; Radio transmission and reception; Part 4: Performance”.

- 3GPP TS 38.522 [16]: NR; User Equipment (UE) conformance specification; Applicability of RF and RRM test cases;

- 3GPP TS 38.533 [17]: NR; User Equipment (UE) conformance specification; Radio resource management;

# 1 Scope

The present document specifies the measurement procedures for the conformance test of the user equipment (UE) that contain RF characteristics for frequency Range 1 as part of the 5G-NR.

The requirements are listed in different clauses only if the corresponding parameters deviate. More generally, tests are only applicable to those mobiles that are intended to support the appropriate functionality. To indicate the circumstances in which tests apply, this is noted in the "*definition and applicability*" part of the test.

For example only Release 15 and later UE declared to support 5G-NR shall be tested for this functionality. In the event that for some tests different conditions apply for different releases, this is indicated within the text of the test itself.

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

For a specific reference, subsequent revisions do not apply.

For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document in the same Release as the present document.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 38.101-1: "NR; User Equipment (UE) radio transmission and reception; Part 1: Range 1 Standalone".

[3] 3GPP TS 38.101-2: " NR; User Equipment (UE) radio transmission and reception; Part 2: Range 2 Standalone".

[4] 3GPP TS 38.101-3: " NR; User Equipment (UE) radio transmission and reception; Part 3: Range 1 and Range 2 Interworking operation with other radios".

[5] 3GPP TS 38.508-1: "5GS; User Equipment (UE) conformance specification; Part 1: Common test environment ".

[6] 3GPP TS 38.331: "NR; Radio Resource Control (RRC); Protocol specification".

[7] Recommendation ITU-R M.1545: "Measurement uncertainty as it applies to test limits for the terrestrial component of International Mobile Telecommunications-2000".

[8] 3GPP TS 38.211: "NR; Physical channels and modulation".

[9] 3GPP TS 38.213: "NR; Physical layer procedures for control".

[10] 3GPP TR 38.903: "NR; Derivation of test tolerances and measurement uncertainty for User Equipment (UE) conformance tests".

[11] 3GPP TR 38.905: "NR; Derivation of test points for radio transmission and reception conformance test cases".

[12] 3GPP TS 38.214: "NR; Physical layer procedures for data".

[13] 3GPP TS 38.521-2: “NR; User Equipment (UE) conformance specification; Radio transmission and reception; Part 2: Range 2 Standalone”.

[14] 3GPP TS 38.521-3: “NR; User Equipment (UE) conformance specification; Radio transmission and reception; Part 3: Range 1 and Range 2 Interworking operation with other radios”.

[15] 3GPP TS 38.521-4: “NR; User Equipment (UE) conformance specification; Radio transmission and reception; Part 4: Performance”.

[16] 3GPP TS 38.522: "NR; User Equipment (UE) conformance specification; Applicability of RF and RRM test cases".

[17] 3GPP TS 38.533: "NR; User Equipment (UE) conformance specification; Applicability of RF and RRM test cases".

[18] 3GPP TS 38.321: "NR; Medium Access Control (MAC) protocol specification".

[19] 3GPP TS 38.133: "NR; Requirements for support of radio resource management ".

[20] 3GPP TS 38.215: "NR; Physical layer measurements".

[21] 3GPP TS 36.521-1: “Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment UE) conformance specification; Radio transmission and reception; Part 1: Conformance Testing”.

[22] ITU-R Recommendation SM.329-10, "Unwanted emissions in the spurious domain".

[23] 3GPP TS 38.307: "NR; Requirements on User Equipments (UEs) supporting a release-independent frequency band".

[24] 3GPP TS 37.213: “Physical layer procedures for shared spectrum channel access”.

[25] 3GPP TS 36.508: "Common test environments for User Equipment (UE)"

[26] 3GPP TS 38.306: “NR; User Equipment (UE) radio access capabilities”.

[27] 3GPP TS 38.104: “NR; Base Station (BS) radio transmission and reception”.

[28] 3GPP TS 36.101: “NR; User Equipment (UE) radio access capabilities”.

# 3 Definitions, symbols and abbreviations

## 3.1 Definitions

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

**Aggregated Channel Bandwidth:** The RF bandwidth in which a UE transmits and receives multiple contiguously aggregated carriers.

**ATG UE: The terminals or user equipments which are mounted in aircraft and support ATG feature as defined in clause 4.2.2. from TS38.306 [15].**

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

**Carrier aggregation band:** A set of one or more operating bands across which multiple carriers are aggregated with a specific set of technical requirements.

**Carrier aggregation bandwidth class:** A class defined by the aggregated transmission bandwidth configuration and maximum number of component carriers supported by a UE.

**Carrier aggregation configuration**: A combination of CA operating band(s) and CA bandwidth class(es) supported by a UE.

**Con-current operation**: The simultaneous transmission and reception of sidelink and Uu interfaces while operation is agnostic of the service used on each interface.

**Contiguous carriers**: A 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 resource allocation**: A resource allocation of consecutive resource blocks within one carrier or across contiguously aggregated carriers. The gap between contiguously aggregated carriers due to the nominal channel spacing is allowed.

**Contiguous spectrum**: Spectrum consisting of a contiguous block of spectrum with no sub-block gaps.

**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.

**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.

**RedCap UE**: The UE with reduced capabilities as defined in clause 4.2.21.1 from TS 38.306 [15].

**Sub-band**: For a UE that supports shared spectrum channel access in wideband operation, a sub-band is the set of RBs within an approximately 20 MHz segment of the channel where the wideband channel is uniformly divided into an integer number of 20 MHz sub-bands. Sub-bands may be separately allocated in uplink and downlink.

**Sub-block:** This is one contiguous allocated block of spectrum for transmission and reception by the same UE. There may be multiple instances of sub-blocks within an RF bandwidth.

**Sub-block bandwidth**: The bandwidth of one sub-block.

**Sub-block gap**: A frequency gap between two consecutive sub-blocks within an RF bandwidth, where the RF requirements in the gap are based on co-existence for un-coordinated operation.

**UE transmission bandwidth configuration**: Set of resource blocks located within the UE channel bandwidth which may be used for transmitting or receiving by the UE.

**Vehicular UE:** A UE embedded in a vehicle, permanently connected to an embedded antenna system that radiates externally for NR operating bands.

NOTE: Vehicular UE does not refer to other UE form factors placed inside the vehicle.

**Wideband operation:** For a UE that supports shared spectrum channel access, wideband operation refers to operation within a channel larger than 20 MHz in which intra-cell guard bands may be configured to distinguish individual RB-sets

## 3.2 Symbols

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

ΔFGlobal Granularity of the global frequency raster

ΔFRaster Band dependent channel raster granularity

ΔfOOB Δ Frequency of Out Of Band emission

ΔFTX-RX Δ Frequency of default TX-RX separation of the FDD operating band

∆MPRc Allowed Maximum Power Reduction relaxation for serving cell *c*

ΔPPowerClass Adjustment to maximum output power for a given power class

ΔR1RReference sensitivity adjustment due to support for 1 antenna ports

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

ΔRIB,c Allowed reference sensitivity relaxation due to support for inter-band CA operation, for serving cell *c*

ΔRIB,4R Reference sensitivity adjustment due to support for 4 antenna ports

ΔShift Channel raster offset

TC Allowed operating band edge transmission power relaxation

TC,*c*Allowed operating band edge transmission power relaxation for serving cell *c*

ΔTIB,c Allowed maximum configured output power relaxation due to support for inter-band CA operation, inter-band NR-DC operation and due to support for SUL operations, for serving cell *c*

BWChannel Channel bandwidth

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

BWChannel\_CA Aggregated channel bandwidth, expressed in MHz

BWChannel,max Maximum channel bandwidth supported among all bands in a release

BWGB max(BWGB,Channel(*k*))

BWGB,Channel(k) Minimum guard band defined in clause 5.3A.1 of carrier *k*

BWDL Channel bandwidth for DL

BWUL Channel bandwidth for UL

BWinterferer Bandwidth of the interferer

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

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

FC RF reference frequency on the channel raster, given in table 5.4.2.2-1

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

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

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

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

FDL\_low The lowest frequency of the downlink operating band

FDL\_high The highest frequency of the downlink operating band

FUL\_low The lowest frequency of the uplink operating band

FUL\_high The highest frequency of the uplink operating band

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

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

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

Fedge, high The *higher edge* of aggregated channel bandwidth, expressed in MHz. Fedge,high = FC,high + Foffset,high

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

FInterferer Frequency of the interferer

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

Foffset Frequency offset from FC, high to the *higher edge* or FC, low to the *lower edge*

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

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

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

FREF RF reference frequency

FREF-Offs Offset used for calculating FREF

FREF,Shift RF reference frequency for Supplementary Uplink (SUL) bands and for the uplink for all FDD bands

Fuw (offset) The frequency separation of the center frequency of the carrier closest to the interferer and the center frequency of the interferer

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

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

Max() The largest of given numbers

Min() The smallest of given numbers

 Physical resource block number

NRACLR NR ACLR

NRB Transmission bandwidth configuration, expressed in units of resource blocks

NRB\_agg The number of the aggregated RBs within the fully allocated aggregated channel bandwidth

for carrier 1 to j, where *μ* is defined in TS 38.211 [8]

NRB,c The transmission bandwidth configuration of component carrier c, expressed in units of resource blocks

for carrier j, where *μ* is defined in TS 38.211 [8]

NRB,largest BW The largest transmission bandwidth configuration of the component carriers in the bandwidth combination, expressed in units of resource blocks

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

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

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

NREF-Offs Offset used for calculating NREF

PCMAX The configured maximum UE output power

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

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

PEMAX Maximum allowed UE output power signalled by higher layers

PEMAX, *c* Maximum allowed UE output power signalled by higher layers for serving cell *c*

PInterferer Modulated mean power of the interferer

Plargest BW Power of the largest transmission bandwidth configuration of the component carriers in the bandwidth combination

PMaxOutputPower The rated maximum ATG UE output power at maximum modulation order and full PRB configurations which is indicated by ATG UE capability [*RatedMOPATG*]

PPowerClass The nominal UE power (i.e., no tolerance)

P-MPR*c* Power Management Maximum Power Reduction for serving cell *c*

PRB The transmitted power per allocated RB, measured in dBm

PUMAX The measured configured maximum UE output power

Puw Power of an unwanted DL signal

Pw Power of a wanted DL signal

RBStart Indicates the lowest RB index of transmitted resource blocks

RBstart\_CA Indicates the lowest RB index of transmitted resource blocks for intra-band contiguous CA

SCSc SCS for the component carrier c, expressed in kHz

SCSlargest BW SCS for the largest transmission bandwidth configuration of the component carriers in the bandwidth combination, expressed in kHz

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

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

*tp* Transient Period value signalled by the UE

*tpstart* Start position of transient period relative to the symbol boundary

T(PCMAX, *f*, *c*) Tolerance for applicable values of PCMAX, *f*, *c* for configured maximum UE output power for carrier *f* of serving cell *c*

TL,c Absolute value of the lower tolerance for the applicable *operating band* as specified in section 6.2.1

SSREF SS block reference frequency position

UTRAACLR UTRA ACLR

## 3.3 Abbreviations

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

ACLR Adjacent Channel Leakage Ratio

ACS Adjacent Channel Selectivity

A-MPR Additional Maximum Power Reduction

ATG Air-To-Ground

BS Base Station

BW Bandwidth

BWP Bandwidth Part

CA Carrier Aggregation

CA\_nX-nY Inter-band CA of component carrier(s) in one sub-block within Band nX and component carrier(s) in one sub-block within Band nY where nX and nY are the applicable NR *operating bands*

CC Component Carriers

CG Carrier Groups

CM Cubic Metric

CORESET Control Resource Set

CP-OFDM Cyclic Prefix-OFDM

CW Continuous Wave

DC Dual Connectivity

DCI Downlink Control Information

DFT-s-OFDM Discrete Fourier Transform-spread-OFDM

DL Downlink

DM-RS Demodulation Reference Signal

DTX Discontinuous Transmission

EIRP Equivalent Isotropically Radiated Power

E-UTRA Evolved UTRA

EVM Error Vector Magnitude

FFT Fast Fourier Transformation

FR Frequency Range

FRC Fixed Reference Channel

GNSS Global Navigation Satellite System

GSCN Global Synchronization Channel Number

HARQ Hybrid Automatic Repeat Request

IBB In-band Blocking

IDFT Inverse Discrete Fourier Transformation

IE Information Element

ITS Intelligent Transportation System

ITU‑R Radio communication Sector of the International Telecommunication Union

MBW Measurement bandwidth defined for the protected band

MCG Master Cell Group

MOP Maximum Output Power

MPR Allowed maximum power reduction

MSD Maximum Sensitivity Degradation

MU Measurement Uncertainty

NR New Radio

NR/5GC NR connected to 5GC

NR-ARFCN NR Absolute Radio Frequency Channel Number

NS Network Signalling

NSA Non-Standalone

OCNG OFDMA Channel Noise Generator

OOB Out-of-band

PBCH Physical Broadcast Channel

PDCCH Physical Downlink Control Channel

PDSCH Physical Downlink Shared Channel

P-MPR Power Management Maximum Power Reduction

PRACH Physical Random Access Channel

PRB Physical Resource Block

PSCCH Physical Sidelink Control CHannel

PSSCH Physical Sidelink Shared CHannel

QAM Quadrature Amplitude Modulation

RB Resource Block

RE Resource Element

RedCap Reduced Capability

REFSENS Reference Sensitivity

RF Radio Frequency

RMC Reference Measurement Channel

RMS Root Mean Square (value)

RNTI Radio Network Tempory Identity

RoT Rise Over Thermal

RSRP Reference Signal Receiving Power

Rx Receiver

SA Standalone

SC Single Carrier

SCG Secondary Cell Group

SCS Subcarrier spacing

SDL Supplementary Downlink

SEM Spectrum Emission Mask

SL Sidelink

SL-MIMO Sidelink-Multiple Antenna transmission

SNR Signal-to-Noise Ratio

SRS Sounding Reference Symbol

SUL Supplementary uplink

SS Synchronization Symbol

SS System Simulator

TAB Transceiver Array Boundary

TAE Time Alignment Error

TAG Timing Advance Group

TPC Transmit Power Control

TT Test Tolerances

Tx Transmitter

TxD Tx Diversity

UE User Equipment

UL Uplink

UL MIMO Uplink Multiple Antenna transmission

ULFPTx Uplink Full Power Transmission

V2X Vehicle to Everything

# 4 General

## 4.1 Relationship between minimum requirements and test requirements

The TS 38.101-1 [2] is a Single-RAT specification for NR UE, covering RF characteristics and minimum performance requirements. Conformance to the TS 38.101-1 [2] is demonstrated by fulfilling the test requirements specified in the present document.

The Minimum Requirements given in TS 38.101-1 [2] make no allowance for measurement uncertainty (MU). The present document defines test tolerances (TT) and measurement uncertainty. These test tolerances are individually defined for each test. The test tolerances are used to relax the minimum requirements in TS 38.101-1 [2] to create test requirements. For some requirements, including regulatory requirements, the test tolerance is set to zero.

The measurement results returned by the test system are compared - without any modification - against the test requirements as defined by various levels of “Shared Risk” principle as described below.

a) Core specification value is not relaxed by any relaxation value (TT=0). For each single measurement, the probability of a borderline good UE being judged as FAIL equals the probability of a borderline bad UE being judged as PASS.

- Test tolerances equal to 0 (TT=0) are considered in this specification.

b) Core specification value is relaxed by a relaxation value (TT>0). For each single measurement, the probability of a borderline bad UE being judged as PASS is greater than the probability of a borderline good UE being judged as FAIL.

- Test tolerances lower than measurement uncertainty and greater than 0 (0 < TT < MU) are considered in this specification.

- Test tolerances high up to measurement uncertainty (TT = MU) are considered in this specification which is also known as “Never fail a good DUT” principle.

c) Core specification value is tightened by a stringent value (TT<0). For each single measurement, the probability of a borderline good UE being judged as FAIL is greater than the probability of a borderline bad UE being judged as PASS.

Test tolerances lower than 0 (TT<0) are not considered in this specification.The “Never fail a good DUT” and the “Shared Risk” principles are defined in Recommendation ITU-R M.1545 [7].

## 4.2 Applicability of minimum requirements

a) In TS 38.101-1 [2] the Minimum Requirements are specified as general requirements and additional requirements. Where the Requirement is specified as a general requirement, the requirement is mandated to be met in all scenarios

b) For specific scenarios for which an additional requirement is specified, in addition to meeting the general requirement, the UE is mandated to meet the additional requirements.

c) The spurious emissions power requirements are for the long-term average of the power. For the purpose of reducing measurement uncertainty it is acceptable to average the measured power over a period of time sufficient to reduce the uncertainty due to the statistical nature of the signal.

d) All the requirements for intra-band contiguous and non-contiguous CA apply under the assumption of the same slot format indicated by UL-DL-configuration-common in the PCell and SCells for NR/5GC.

e) The requirements for Tx diversity in this release are applied for UE which indicates IE *txDiversity-r16*.

## 4.3 Specification suffix information

Unless stated otherwise the following suffixes are used for indicating at 2nd level subclause, shown in Table 4.3-1.

Table 4.3-1: Definition of suffixes

|  |  |
| --- | --- |
| Clause suffix | Variant |
| None | Single Carrier |
| A | Carrier Aggregation (CA) |
| B | Dual-Connectivity (DC) |
| C | Supplement Uplink (SUL) |
| D | UL MIMO |
| E | V2X |
| F | Shared spectrum channel access |
| G | Tx Diversity (TxD) |
| I | RedCap |
| J | ATG |

A terminal which supports the above features needs to meet both the general requirements and the additional requirement applicable to the additional subclause (suffixes A to J) in clauses 5, 6 and 7. Where there is a difference in requirement between the general requirements and the additional subclause requirements (suffixes A to I) in clauses 5, 6 and 7, the tighter requirements are applicable unless stated otherwise in the additional subclause.

A terminal which supports more than one feature in clauses 5, 6 and 7 shall meet all of the separate corresponding requirements.

For a terminal that supports SUL for the band combination specified in Table 5.2C-1, the current version of the specification assumes the terminal is configured with active transmission either on UL carrier or SUL carrier at any time in one serving cell and the UE requirements for single carrier shall apply for the active UL or SUL carrier accordingly.

For a terminal that supports operation in shared spectrum, the current version of this specification assumes in the uplink sub-bands within a wideband channel shall be contiguously allocated to the UE. The uplink requirements for one or more non-transmitted sub-bands between two transmitted sub-bands does not form a part of the current version of this specification.

## 4.4 Test points analysis

The information on test point analysis and test point selection including number of test points for each test case is shown in TR 38.905 [11] clause 4.1.

## 4.5 Applicability and test coverage rules

The applicability and test coverage rules for NR/5GC and EN-DC capable devices shall include the following:

If a test case for a FR1 NR band in a device is tested in EN-DC mode inter-band operation for non-exceptional requirement as per TS 38.521-3 [14], it shall fulfil the coverage requirement for that test case for NR/5GC FR1 test requirements for that NR band and need not be retested.

Unless there are exception requirements defined within the NR-DC test cases in clause 6 and 7 of this spec: if a DUT is tested on an FR1 NR-CA configuration, the DUT need not be re-tested for the FR1 NR-DC configuration involving the same bands within the component carriers/carrier groups (CGs).

Editor’s Note: The Clause number 4.5 already exists in the specification. so the clause number was changed to 4.6:

## 4.6 Pass fail decision rule of test case

Unless explicitly specified, a test case is passed only when all the measurements in the test case are passed. A measurement is one execution of the test procedures using a specific combination of various conditions, including test configuration, testing UL/DL power level, frequency location of interference and sweeping frequency location of emission measurement etc. If multiple component carriers are involved in one measurement, the measurement is passed only when all the component carriers are passed.

# 5 Operating bands and Channel arrangement

## 5.1 General

The channel arrangements presented in this clause are based on the operating bands and channel bandwidths defined in the present release of specifications.

NOTE: Other operating bands and channel bandwidths may be considered in future releases.

Requirements throughout the RF specifications are in many cases defined separately for different frequency ranges (FR). The frequency ranges in which NR can operate according to this version of the specification are identified as described in Table 5.1-1.

Table 5.1-1: Definition of frequency ranges

|  |  |
| --- | --- |
| Frequency range designation | Corresponding frequency range |
| FR1 | 410 MHz – 7125 MHz |
| FR2 | 24250 MHz – 52600 MHz |

The present specification covers FR1 operating bands.

## 5.2 Operating bands

NR is designed to operate in the FR1 operating bands defined in Table 5.2-1.

Table 5.2-1: NR operating bands in FR1

|  |  |  |  |
| --- | --- | --- | --- |
| NR operating band | Uplink (UL) *operating band* BS receive / UE transmit  FUL\_low  – FUL\_high | Downlink (DL) *operating band* BS transmit / UE receive  FDL\_low – FDL\_high | Duplex Mode |
| n1 | 1920 MHz – 1980 MHz | 2110 MHz – 2170 MHz | FDD |
| n2 | 1850 MHz – 1910 MHz | 1930 MHz – 1990 MHz | FDD |
| n3 | 1710 MHz – 1785 MHz | 1805 MHz – 1880 MHz | FDD |
| n5 | 824 MHz – 849 MHz | 869 MHz – 894 MHz | FDD |
| n7 | 2500 MHz – 2570 MHz | 2620 MHz – 2690 MHz | FDD |
| n8 | 880 MHz – 915 MHz | 925 MHz – 960 MHz | FDD |
| n12 | 699 MHz – 716 MHz | 729 MHz – 746 MHz | FDD |
| n13 | 777 MHz – 787 MHz | 746 MHz – 756 MHz | FDD |
| n14 | 788 MHz – 798 MHz | 758 MHz – 768 MHz | FDD |
| n20 | 832 MHz – 862 MHz | 791 MHz – 821 MHz | FDD |
| n2416 | 1626.5 MHz – 1660.5 MHz | 1525 MHz – 1559 MHz | FDD |
| n25 | 1850 MHz – 1915 MHz | 1930 MHz – 1995 MHz | FDD |
| n26 | 814 MHz – 849 MHz | 859 MHz – 894 MHz | FDD |
| n28 | 703 MHz – 748 MHz | 758 MHz – 803 MHz | FDD |
| n29 | N/A | 717 MHz – 728 MHz | SDL |
| n303 | 2305 Mhz – 2315 MHz | 2350 MHz – 2360 MHz | FDD |
| n34 | 2010 MHz – 2025 MHz | 2010 MHz – 2025 MHz | TDD |
| n3810 | 2570 MHz – 2620 MHz | 2570 MHz – 2620 MHz | TDD |
| n39 | 1880 MHz – 1920 MHz | 1880 MHz – 1920 MHz | TDD |
| n40 | 2300 MHz – 2400 MHz | 2300 MHz – 2400 MHz | TDD |
| n41 | 2496 MHz – 2690 MHz | 2496 MHz – 2690 MHz | TDD |
| n46 | 5150 MHz – 5925 MHz | 5150 MHz – 5925 MHz | TDD13 |
| n4711 | 5855 MHz – 5925 MHz | 5855 MHz – 5925 MHz | TDD |
| n48 | 3550 MHz – 3700 MHz | 3550 MHz – 3700 MHz | TDD |
| n50 | 1432 MHz – 1517 MHz | 1432 MHz – 1517 MHz | TDD1 |
| n51 | 1427 MHz – 1432 MHz | 1427 MHz – 1432 MHz | TDD |
| n53 | 2483.5 MHz – 2495 MHz | 2483.5 MHz – 2495 MHz | TDD |
| n65 | 1920 MHz – 2010 MHz | 2110 MHz – 2200 MHz | FDD4 |
| n66 | 1710 MHz – 1780 MHz | 2110 MHz – 2200 MHz | FDD |
| n70 | 1695 MHz – 1710 MHz | 1995 MHz – 2020 MHz | FDD |
| n71 | 663 MHz – 698 MHz | 617 MHz – 652 MHz | FDD |
| n74 | 1427 MHz – 1470 MHz | 1475 MHz – 1518 MHz | FDD |
| n75 | N/A | 1432 MHz – 1517 MHz | SDL |
| n76 | N/A | 1427 MHz – 1432 MHz | SDL |
| n7712 | 3300 MHz – 4200 MHz | 3300 MHz – 4200 MHz | TDD |
| n78 | 3300 MHz – 3800 MHz | 3300 MHz – 3800 MHz | TDD |
| n79 | 4400 MHz – 5000 MHz | 4400 MHz – 5000 MHz | TDD |
| n80 | 1710 MHz – 1785 MHz | N/A | SUL |
| n81 | 880 MHz – 915 MHz | N/A | SUL |
| n82 | 832 MHz – 862 MHz | N/A | SUL |
| n83 | 703 MHz – 748 MHz | N/A | SUL |
| n84 | 1920 MHz – 1980 MHz | N/A | SUL |
| n86 | 1710 MHz – 1780 MHz | N/A | SUL |
| n91 | 832 MHz – 862 MHz | 1427 MHz – 1432 MHz | FDD9 |
| n92 | 832 MHz – 862 MHz | 1432 MHz – 1517 MHz | FDD9 |
| n93 | 880 MHz – 915 MHz | 1427 MHz – 1432 MHz | FDD9 |
| n94 | 880 MHz – 915 MHz | 1432 MHz – 1517 MHz | FDD9 |
| n958 | 2010 MHz – 2025 MHz | N/A | SUL |
| n9614 | 5925 MHz – 7125 MHz | 5925 MHz – 7125 MHz | TDD13 |
| n9715 | 2300 MHz – 2400 MHz | N/A | SUL |
| n9916 | 1626.5 MHz – 1660.5 MHz | N/A | SUL |
| n100 | 874.4 MHz – 880 MHz | 919.4 MHz – 925 MHz | FDD |
| n101 | 1900 MHz – 1910 MHz | 1900 MHz – 1910 MHz | TDD |
| NOTE 1: UE that complies with the NR Band n50 minimum requirements in this specification. Shall also comply with the NR Band n51 minimum requirements.  NOTE 2: UE that complies with the NR Band n75 minimum requirements in this specification. Shall also comply with the NR Band n76 minimum requirements.  NOTE 3: Uplink transmission is not allowed at this band for UE with external vehicle-mounted antennas.  NOTE 4: A UE that complies with the NR Band n65 minimum requirements in this specification shall also comply with the NR Band n1 minimum requirements.  NOTE 5: FFS.  NOTE 6: A UE that supports NR Band n66 shall receive in the entire DL operating band.  NOTE 7: A UE that supports NR Band n66 and CA operation in any CA band shall also comply with the minimum requirements specified for the DL CA configurations CA\_n66B and CA\_n66(2A) in the current version of the specification.  NOTE 8: This band is applicable in China only.  NOTE 9: Variable duplex operation does not enable dynamic variable duplex configuration by the network, and is used such that DL and UL frequency ranges are supported independently in any valid frequency range for the band.  NOTE 10: When this band is used for V2X SL service, the band is exclusively used for NR V2X in particular regions.  NOTE 11: This band is unlicensed band used for V2X service. There is no expected network deployment in this band.  NOTE 12: In the USA this band is restricted to 3450 – 3550 MHz and 3700 – 3980 MHz. In Canada this band is restricted to 3450 – 3650 MHz and 3650 – 3980 MHz.  NOTE 13: This band is restricted to operation with shared spectrum channel access as defined in 37.213 [24].  NOTE 14: This band is applicable only in countries/regions designating this band for shareds pectrum access use subject to country-specific conditions.  NOTE 15: The requirements for this band are applicable only where no other NR or E-UTRA TDD operating band(s) are used within the frequency range of this band in the same geographical area. For scenarios where other NR or E-UTRA TDD operating band(s) are used within the frequency range of this band in the same geographical area, special co-existence requirements may apply that are not covered by the 3GPP specifications.  NOTE 16: DL operation in this band is restricted to 1526 – 1536 MHz and UL operation is restricted to 1627.5 – 1637.5 MHz and 1646.5 – 1656.5 MHz. | | | |

## 5.2A Operating bands for CA

### 5.2A.1 Intra-band CA

NR intra-band contiguous carrier aggregation is designed to operate in the operating bands defined in Table 5.2A.1-1 and Table 5.2A.1-2, where all operating bands are within FR1.

Table 5.2A.1-1: Intra-band contiguous CA operating bands in FR1

|  |  |
| --- | --- |
| NR CA Band | NR Band  (Table 5.2-1) |
| CA\_n40 | n40 |
| CA\_n411 | n41 |
| CA\_n461 | n46 |
| CA\_n48 | n48 |
| CA\_n66 | n66 |
| CA\_n771 | n77 |
| CA\_n781 | n78 |
| CA\_n791 | n79 |
| NOTE 1: The minimum requirements only apply for non‑simultaneous Tx/Rx between all carriers for TDD combinations. | |

Table 5.2A.1-2: Intra-band non-contiguous CA operating bands in FR1

|  |  |
| --- | --- |
| NR CA Band | NR Band  (Table 5.2-1) |
| CA\_n2(\*) | n2 |
| CA\_n48(\*) | n48 |
| CA\_n66(\*) | n66 |
| CA\_n71(\*) | n71 |
| CA\_n77(\*) | n77 |
| CA\_n78(\*) | n78 |
| NOTE 1: The minimum requirements only apply for non simultaneous Tx/Rx between all carriers. for TDD combinations.  NOTE 2: The notation CA\_nX(\*) in this table indicates intra-band non-contiguous CA for band nX. The configurations for each band are in 5.5A.2. | |

### 5.2A.2 Inter-band CA

NR inter-band carrier aggregation is designed to operate in the operating bands defined in Table 5.2A.2.1-1, 5.2A.2.2-1 and Table 5.2A.2.3-1, where all operating bands are within FR1.

If the mandatory simultaneous Rx/Tx capability applies for a lower order band combination, when the applicable lower order band combination is a band pair in a higher order band combination, the mandatory simultaneous Rx/Tx capability also applies for the band pair in the higher order band combination.

Table 5.2A.2-1: Void

Table 5.2A.2-2: Void

Table 5.2A.2-3: Void

#### 5.2A.2.1 Inter-band CA (two bands)

Table 5.2A.2.1-1: Inter-band CA operating bands involving FR1 (two bands)

|  |  |  |
| --- | --- | --- |
| NR CA Band | NR Band  (Table 5.2-1) | DL interruption allowed (Note 8) |
| CA\_n1-n3 | n1, n3 |  |
| CA\_n1-n8 | n1, n8 |  |
| CA\_n1-n28 | n1, n28 |  |
| CA\_n1-n411 | n1, n41 |  |
| CA\_n1-n771 | n1, n77 | No |
| CA\_n1-n781 | n1, n78 | No |
| CA\_n1-n791 | n1, n79 | No |
| CA\_n2-n5 | n2, n5 |  |
| CA\_n2-n14 | n2, n14 |  |
| CA\_n2-n48 | n2, n48 |  |
| CA\_n2-n66 | n2, n66 |  |
| CA\_n2-n77 | n2, n77 |  |
| CA\_n3-n5 | n3, n5 |  |
| CA\_n3-n8 | n3, n8 |  |
| CA\_n3-n28 | n3, n28 |  |
| CA\_n3-n411 | n3, n41 | No |
| CA\_n3-n771 | n3, n77 | No |
| CA\_n3-n781 | n3, n78 | No |
| CA\_n5-n7 | n5, n7 |  |
| CA\_n5-n48 | n5, n48 |  |
| CA\_n5-n66 | n5, n66 |  |
| CA\_n5-n771 | n5, n77 |  |
| CA\_n5-n781 | n5, n78 | No |
| CA\_n7-n781 | n7, n78 |  |
| CA n8-n781 | n8, n78 | No |
| CA\_n14-n30 | n14, n30 |  |
| CA\_n14-n66 | n14, n66 |  |
| CA\_n14-n77 | n14, n77 |  |
| CA\_n20-n78 | n20, n78 |  |
| CA\_n24-n41 | n24, n41 |  |
| CA\_n24-n48 | n24, n48 |  |
| CA\_n24-n77 | n24, n77 |  |
| CA\_n25-n66 | n25, n66 |  |
| CA\_n25-n77 | n25, n77 |  |
| CA\_n25-n78 | n25, n78 |  |
| CA\_n25-n466 | n25, n46 |  |
| CA\_n26-n66 | n26, n66 |  |
| CA\_n26-n70 | n26, n70 |  |
| CA\_n28-n411 | n28, n41 |  |
| CA\_n28-n771 | n28, n77 | No |
| CA\_n28\_n781 | n28, n78 | No |
| CA\_n28-n791 | n28, n79 |  |
| CA\_n29-n66 | n29, n66 |  |
| CA\_n29-n70 | n29, n70 |  |
| CA\_n29-n71 | n29, n71 |  |
| CA\_n39-n41 | n39, n41 | No |
| CA\_n41-n66 | n41, n66 |  |
| CA\_n41-n711 | n41, n71 |  |
| CA\_n41-n771 | n41, n77 |  |
| CA\_n41-n791,3 | n41, n79 | No |
| CA\_n46-n481,6 | n46, n48 |  |
| CA\_n46-n666 | n46, n66 |  |
| CA\_n48-n66 | n48, n66 |  |
| CA\_n48-n70 | n48, n70 |  |
| CA\_n48-n71 | n48, n71 |  |
| CA\_n48-n7713,14,18 | n48, n77 |  |
| CA\_n66-n70 | n66, n70 |  |
| CA\_n66-n71 | n66, n71 |  |
| CA\_n66-n77 | n66, n77 |  |
| CA\_n66-n78 | n66, n78 |  |
| CA\_n70-n71 | n70, n71 |  |
| CA\_n71-n77 | n70, n71 |  |
| CA\_n71-n78 | n71, n78 |  |
| CA\_n77-n795,7 | n77, n79 |  |
| CA\_n78-n795 | n78, n79 |  |
| NOTE 1: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability.  NOTE 2: FFS.  NOTE 3: The frequency range below 2506MHz for Band n41 is not used in this combination.  NOTE 4: Applicable for frequency range above 4800 MHz for Band n79 in this combination.  NOTE 5: For UEs supporting band n77, the minimum requirements apply only when there is non-simultaneous Rx/Tx operation between n78-n79 NR carriers. This restriction applies also for these carriers when applicable NR CA configuration is part of a higher order configuration.  NOTE 6: The PCell is allocated in the licensed band in this combination.  NOTE 7: The minimum requirements apply only when there is non-simultaneous Rx/Tx operation between n77-n79 NR carriers. This restriction applies also for these carriers when applicable NR CA configuration is part of a higher order configuration.  NOTE 8: Applicable when dynamic Tx switching is conducted. The DL interruption requirement is specified in clause 8.2.2.2.10 of 38.133 [13].  NOTE 9: FFS  NOTE 10 FFS  NOTE 11: FFS  NOTE 12: FFS  NOTE 13: Simultaneous Rx/Tx capability for TDD combinations does not apply for UEs supporting band n48 with an n77 implementation.  NOTE 14: The band n48 and n77 will synchronize their uplink and downlink configurations and in commonly TDD network coordination  NOTE 15: FFS  NOTE 16: FFS  NOTE 17: FFS  NOTE 18: The minimum requirements for inter-band CA apply when the maximum power spectral density imbalance between downlink carriers is within 6 dB. The power spectral density imbalance condition also applies for these carriers when applicable CA configuration is a subset of a higher order CA configuration. | | |

#### 5.2A.2.2 Inter-band CA (three bands)

Table 5.2A.2.2-1: Inter-band CA operating bands involving FR1 (three bands)

|  |  |  |
| --- | --- | --- |
| NR CA Band | NR Band  (Table 5.2-1) | DL interruption allowed  (Note 4) |
| CA\_n1-n3-n28 | n1, n3, n28 |  |
| CA\_n1-n3-n77 | n1, n3, n77 |  |
| CA\_n1-n3-n783 | n1, n3, n78 | No for CA\_n1-n78, CA\_n3-n78 |
| CA\_n1-n8-n783 | n1, n8, n78 |  |
| CA\_n1-n28-n773 | n1, n28, n77 |  |
| CA\_n1-n28-n783 | n1, n28, n78 |  |
| CA\_n1-n41-n773 | n1, n41, n77 |  |
| CA\_n1-n78-n79 | n1, n78, n79 |  |
| CA\_n2-n5-n48 | n2, n5, n48 |  |
| CA\_n2-n5-n77 | n2, n5, n77 |  |
| CA\_n2-n48-n66 | n2, n48, n66 |  |
| CA\_n2-n48-n77 | n2, n48, n77 |  |
| CA\_n2-n66-n77 | n2, n66, n77 |  |
| CA\_n3-n28-n413 | n3, n28, n41 |  |
| CA\_n3-n28-n773 | n3, n28, n77 |  |
| CA\_n3-n28-n783 | n3, n28, n78 |  |
| CA\_n3-n41-n773 | n3, n41, n77 |  |
| CA\_n5-n48-n66 | n5, n48, n66 |  |
| CA\_n5-n48-n77 | n5, n48, n77 |  |
| CA\_n5-n66-n77 | n5, n66, n77 |  |
| CA\_n25-n66-n77 | n25, n66, n77 |  |
| CA\_n25-n66-n78 | n25, n66, n78 |  |
| CA\_n26-n66-n70 | n26, n66, n70 |  |
| CA\_n28-n41-n793 | n28, n41, n79 |  |
| CA\_n29-n66-n70 | n29, n66, n70 |  |
| CA\_n41-n66-n71 | n41, n66, n71 |  |
| CA\_n48-n66-n70 | n48, n66, n70 |  |
| CA\_n48-n66-n71 | n48, n66, n71 |  |
| CA\_n48-n66-n77 | n48, n66, n77 |  |
| CA\_n48-n70-n71 | n48, n70, n71 |  |
| CA\_n66-n70-n71 | n66, n70, n71 |  |
| CA\_n66-n71-n77 | n66, n71, n77 |  |
| CA\_n66-n71-n78 | n66, n71, n78 |  |
| NOTE 1: FFS  NOTE 2: FFS  NOTE 3: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability.  NOTE 4: Applicable when dynamic Tx switching is conducted. The DL interruption requirement is specified in clause 8.2.2.2.10 of 38.133 [13]. | | |

#### 5.2A.2.3 Inter-band CA (four bands)

Table 5.2A.2.3-1: Inter-band CA operating bands involving FR1 (four bands)

|  |  |
| --- | --- |
| NR CA Band | NR Band  (Table 5.2-1) |
| CA\_n1-n3-n28-n781 | n1, n3, n28, n78 |
| CA\_n2-n5-n48-n66 | n2, n5, n48, n66 |
| CA\_n2-n5-n48-n77 | n2, n5, n48, n77 |
| CA\_n2-n5-n66-n77 | n2, n5, n66, n77 |
| CA\_n2-n48-n66-n77 | n2, n48, n66, n77 |
| CA\_n5-n48-n66-n77 | n5, n48, n66, n77 |
| NOTE 1: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability. | |

## 5.2B Operating bands for DC

The operating bands are specified in clause 5.5B for operation with NR dual connectivity configured, where all operating bands are within FR1.

If the mandatory simultaneous Rx/Tx capability applies for a band combination, the mandatory simultaneous Rx/Tx capability also applies for the band combination when the applicable band combination is a subset of a higher order band combination.

## 5.2C Operating band combination for SUL

NR operation is designed to operate in the operating band combination defined in Table 5.2C-1, Table 5.2C-2, Table 5.2C-3 and Table 5.2C-4, where all operating bands are within FR1.

If the mandatory simultaneous Rx/Tx capability applies for a band combination, the mandatory simultaneous Rx/Tx capability also applies for the band combination when the applicable band combination is a subset of a higher order band combination.

Table 5.2C-1: Operating band combination for SUL in FR1

|  |  |
| --- | --- |
| NR Band combination for SUL | NR Band  (Table 5.2-1) |
| SUL\_n41-n832 | n41, n83 |
| SUL\_n78-n802 | n78, n80 |
| SUL\_n78-n812 | n78, n81 |
| SUL\_n78-n822 | n78, n82 |
| SUL\_n78-n832 | n78, n83 |
| SUL\_n78-n842 | n78, n84 |
| SUL\_n78-n862 | n78, n86 |
| SUL\_n79-n802 | n79, n80 |
| SUL\_n79-n812 | n79, n81 |
| SUL\_n79-n832 | n79, n83 |
| NOTE 1: If a UE is configured with both NR UL and NR SUL carriers in a cell, the switching time between NR UL carrier and NR SUL carrier is 0us.  NOTE 2: For UE supporting SUL band combination simultaneous Rx/Tx capability is mandatory.  NOTE 3: For release 15 and release 16 UE supporting SUL band combination, UL MIMO is not configured on SUL carrier. | |

Table 5.2C-2: Operating SUL band combination with intra-band non-contiguous CA in FR1

FFS

Table 5.2C-3: Operating SUL band combination with intra-band contiguous CA in FR1

|  |  |
| --- | --- |
| NR Band combination for SUL | NR Band  (Table 5.2-1) |
| SUL\_n41-n83 | n41, n83 |
| SUL\_n78-n80 | n78, n80 |
| SUL\_n78-n84 | n78, n84 |
| SUL\_n79-n83 | n79, n83 |
| NOTE 1: If a UE is configured with both NR UL and NR SUL carriers in a cell, the switching time between NR UL carrier and NR SUL carrier is 0 us.  NOTE 2: For UE supporting SUL band combination simultaneous Rx/Tx capability is mandatory. | |

Table 5.2C-4: Operating SUL band combination with inter-band CA in FR1

|  |  |
| --- | --- |
| NR Band combination for SUL | NR Band  (Table 5.2-1) |
| CA\_n1\_n78-n80 | n1, n78, n80 |
| CA\_n1\_SUL\_n78-n84 | n1, n78, n84 |
| CA\_n3\_n78-n80 | n3, n78, n80 |
| CA\_n28\_n41-n83 | n28, n41, n83 |
| CA\_n28\_n79-n83 | n28, n79, n83 |
| NOTE 1: If a UE is configured with both NR UL and NR SUL carriers in a cell, the switching time between NR UL carrier and NR SUL carrier is 0 us.  NOTE 2: For UE supporting SUL band combination simultaneous Rx/Tx capability is mandatory. | |

## 5.2D Operating bands for UL MIMO

NR is designed to support UL MIMO where all of the operating bands are in FR1 defined in Table 5.2D-1.

Table 5.2D-1: NR operating bands for UL MIMO in FR1

|  |
| --- |
| NR operating band |
| n1 |
| n2 |
| n3 |
| n5 |
| n7 |
| n8 |
| n25 |
| n28 |
| n301 |
| n34 |
| n38 |
| n39 |
| n40 |
| n41 |
| n46 |
| n48 |
| n66 |
| n70 |
| n71 |
| n77 |
| n78 |
| n79 |
| n80 |
| n84 |
| n95 |
| n97 |
| NOTE 1: Uplink transmission is not allowed at this band for UE with external vehicle-mounted antennas.  NOTE 2: Void. |

## 5.2E Operating band for V2X

### 5.2E.1 V2X operating bands

NR V2X is designed to operate in the operating bands in FR1 defined in Table 5.2E.1-1.

Table 5.2E.1-1: V2X operating bands in FR1

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| V2X Operating Band | Sidelink (SL) Transmission operating band | | | Sidelink (SL) Reception operating band | | | Duplex Mode | Interface |
| FUL\_low – FUL\_high | | | FDL\_low – FDL\_high | | |
| n381 | 2570 MHz | - | 2620 MHz | 2570 MHz | - | 2620 MHz | HD | PC5 |
| n47 | 5855 MHz | - | 5925 MHz | 5855 MHz | - | 5925 MHz | HD | PC5 |
| NOTE 1: When this band is used for V2X SL service, the band is exclusively used for NR V2X in particular regions. | | | | | | | | |

### 5.2E.2 V2X operating bands for concurrent operation

NR V2X operation is designed to operate concurrent with NR uplink/downlink on the operating bands combinations listed in Table 5.2E.2-1.

Table 5.2E.2-1: Inter-band con-current V2X operating bands

|  |  |  |
| --- | --- | --- |
| V2X con-current operating Band | NR or V2X Operating Band | Interface |
| V2X\_n71-n47 | n71 | Uu |
| n47 | PC5 |

## 5.2J Operating band for ATG

NR is designed to support ATG where all of the operating bands are in FR1 defined in Table 5.2J-1.

Table 5.2J-1: NR operating bands for ATG in FR1

|  |
| --- |
| NR operating band |
| n1 |
| n3 |
| n34 |
| n39 |
| n41 |
| n78 |
| n79 |

## 5.3 UE channel bandwidth

### 5.3.1 General

The UE channel bandwidth supports a single NR RF carrier in the uplink or downlink at the UE. From a BS perspective, different UE channel bandwidths may be supported within the same spectrum for transmitting to and receiving from UEs connected to the BS. Transmission of multiple carriers to the same UE (CA) or multiple carriers to different UEs within the BS channel bandwidth can be supported.

From a UE perspective, the UE is configured with one or more BWP / carriers, each with its own UE channel bandwidth. The UE does not need to be aware of the BS channel bandwidth or how the BS allocates bandwidth to different UEs.

The placement of the UE channel bandwidth for each UE carrier is flexible but can only be completely within the BS channel bandwidth.

The relationship between the channel bandwidth, the guardband and the maximum transmission bandwidth configuration is shown in Figure 5.3.1-1.



Figure 5.3.1-1: Definition of the channel bandwidth and the maximum transmission bandwidth configuration for one NR channel

### 5.3.2 Maximum transmission bandwidth configuration

The maximum transmission bandwidth configuration NRB for each UE channel bandwidth and subcarrier spacing is specified in Table 5.3.2-1.

Table 5.3.2-1: Maximum transmission bandwidth configuration NRB

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| SCS (kHz) | 5 MHz | 10 MHz | 15 MHz | 20 MHz | 25 MHz | 30 MHz | 35 MHz | 40 MHz | 45 MHz | 50 MHz | 60 MHz | 70 MHz | 80 MHz | 90 MHz | 100 MHz |
| NRB | NRB | NRB | NRB | NRB | NRB | NRB | NRB | NRB | NRB | NRB | NRB | NRB | NRB | NRB |
| 15 | 25 | 52 | 79 | 106 | 133 | 160 | 188 | 216 | 242 | 270 | N/A | N/A | N/A | N/A | N/A |
| 30 | 11 | 24 | 38 | 51 | 65 | 78 | 92 | 106 | 119 | 133 | 162 | 189 | 217 | 245 | 273 |
| 60 | N/A | 11 | 18 | 24 | 31 | 38 | 44 | 51 | 58 | 65 | 79 | 93 | 107 | 121 | 135 |

### 5.3.3 Minimum guard band and transmission bandwidth configuration

The minimum guard band for each UE channel bandwidth and SCS is specified in Table 5.3.3-1.

Table 5.3.3-1: Minimum guard band for each UE channel bandwidth and SCS (kHz)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| SCS (kHz) | 5 MHz | 10 MHz | 15 MHz | 20 MHz | 25 MHz | 30 MHz | 35 MHz | 40 MHz | 45 MHz | 50 MHz | 60 MHz | 70 MHz | 80 MHz | 90 MHz | 100 MHz |
| 15 | 242.5 | 312.5 | 382.5 | 452.5 | 522.5 | 592.5 | 572.5 | 552.5 | 712.5 | 692.5 | N/A | N/A | N/A | N/A | N/A |
| 30 | 505 | 665 | 645 | 805 | 785 | 945 | 925 | 905 | 1065 | 1045 | 825 | 965 | 925 | 885 | 845 |
| 60 | N/A | 1010 | 990 | 1330 | 1310 | 1290 | 1630 | 1610 | 1590 | 1570 | 1530 | 1490 | 1450 | 1410 | 1370 |

NOTE: The minimum guard bands have been calculated using the following equation: GBchannel = (BWchannel x 1000 (kHz) - NRB x SCS x 12) / 2 - SCS/2, where NRB are from Table 5.3.2-1 and GBchannel expressed in kHz.

Figure 5.3.3-1: Void

The number of RBs configured in any channel bandwidth shall ensure that the minimum guard band specified in this clause is met.

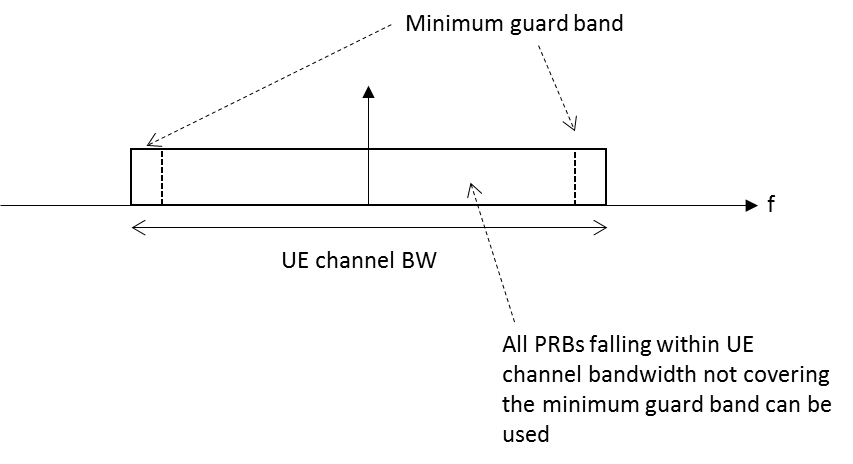


Figure 5.3.3-2: UE PRB utilization

In the case that multiple numerologies are multiplexed in the same symbol due to BS transmission of SSB, the minimum guard band on each side of the carrier is the guard band applied at the configured channel bandwidth for the numerology that is received immediately adjacent to the guard.

If multiple numerologies are multiplexed in the same symbol and the UE channel bandwidth is >50 MHz, the minimum guardband applied adjacent to 15 kHz SCS shall be the same as the minimum guardband defined for 30 kHz SCS for the same UE channel bandwidth.

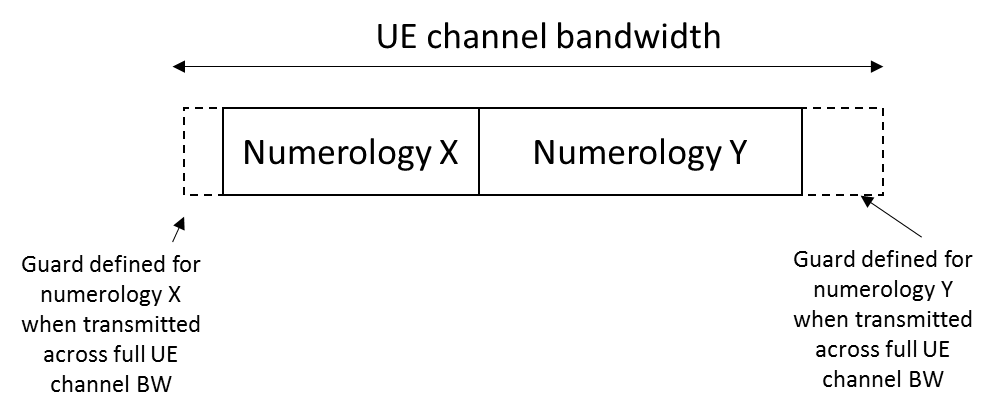


Figure 5.3.3-3: Guard band definition when transmitting multiple numerologies

NOTE: Figure 5.3.3-3 is not intended to imply the size of any guard between the two numerologies. Inter-numerology guard band within the carrier is implementation dependent.

[For a UE supporting wideband operation], the nominal intra-cell guard bands and the corresponding sizes of the RB sets separated by the said guard bands are as specified in Table 5.3.3-2 for each UE channel bandwidth and sub-carrier spacing for the downlink and uplink. The nominal intra-cell guard bands in Table 5.3.3-2 are applicable when the respective IE *intraCellGuardBandsUL-List* and *intraCellGuardBandsDL-List* [6] for the uplink and downlink are not provided, as specified in [12] clause 7.

Table 5.3.3-2: Nominal intra-cell guard bands for wideband operation

|  |  |  |  |
| --- | --- | --- | --- |
| SCS  (kHz) | 40 MHz | 60 MHz | 80 MHz |
| 15 | 105-6-105  (216) | N/A | N/A |
| 30 | 50-6-50  (106) | 50-6-50-6-50  (162) | 50-6-50-5-50-6-50  (217) |
| 60 | 23-5-23  (51) | 23-5-23-5-23  (79) | 23-5-23-5-23-5-23  (107) |
| NOTE 1: The intra-cell guard band is denoted TBW0-GB0-…-GBN\_RBset-2-TBWN\_RBset-1 for N\_RBset > 1 number of RB-sets with TBW*r* the maximum transmission bandwidth (PRB) of RB-set *r* and GB*r* the guard band (PRB) above the upper edge of RB-set *r*. The RB-set 0 is starting at the first common resource block (CRB) of the carrier as indicated by *offsetToCarrier*. The total transmission bandwidth configuration (size of resource grid) including guard bands is given in between parentheses. | | | |

For a UE that supports shared spectrum channel access, there are no uplink or downlink intra-cell guard bands for operation with 10 MHz and 20 MHz channel bandwidths; the maximum transmission bandwidth configurations for these channel bandwidths are in accordance with clause 5.3.2.

For each UE channel bandwidth and sub-carrier spacing given by Table 5.3.3-2, the maximum transmission bandwidth configuration of the carrier including intra-cell guard bands, if configured for the uplink and downlink by the respective IE *intraCellGuardBandsUL-List* and *intraCellGuardBandsDL-List* [6], and corresponding RB-set(s) shall be in accordance with clause 5.3.2 with a minimum inter-cell guard band of the UE channel bandwidth as specified in Table 5.3.3-1 for the uplink and downlink. Minimum requirements specified for wideband operation in Clause 6 and Clause 7 also apply for intra-cell guard bands larger than the nominal sizes in Table 5.3.3-2 as listed in Table 5.3.3-3 for each sub-carrier spacing; each guard band in order of CRB index must be larger than or equal to the corresponding nominal guard band specified in Table 5.3.3-2 for each channel bandwidth.

Table 5.3.3-3: Applicable intra-cell guard bands for wideband operation

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | SCS | |
|  |  | 15 kHz | 30 kHz |
| Intra-cell guard band (size) | PRB | 6,7 | 5,6,7 |
| Transmission bandwidth (size) of RB-set | PRB | 104,105 | 49,50,51 |

If the UE is configured with zero width intra-cell guard bands for the uplink and downlink by the IE *intraCellGuardBandsUL-List* and *intraCellGuardBandsDL-List* [6] on a carrier greater than 20 MHz, the maximum transmission bandwidth configuration for the uplink and downlink shall be in accordance with clause 5.3.2 with a minimum inter-cell guard band of the UE channel bandwidth as specified in Table 5.3.3-1.

### 5.3.4 RB alignment

For each numerology, its common resource blocks are specified in Clause 4.4.4.3 in TS 38.211 [8], and the starting point of its transmission bandwidth configuration on the common resource block grid for a given channel bandwidth is indicated by an offset to “Reference point A” in the unit of the numerology. The *UE transmission bandwidth* *configuration* is indicated by the higher layer parameter *carrierBandwidth* [6] and will fulfil the minimum UE guard band requirement specified in Clause 5.3.3.

### 5.3.5 UE channel bandwidth per operating band

The requirements in this specification apply to the combination of channel bandwidths, SCS and operating bands shown in Table 5.3.5-1. The transmission bandwidth configuration in Table 5.3.2-1 shall be supported for each of the specified channel bandwidths. The channel bandwidths are specified for both the TX and RX path.

Table 5.3.5-1: Channel Bandwidths for each NR band

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR Band | SCS  (kHz) |  | UE Channel bandwidth (MHz) | | | | | | | | | | | | | |
| 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 60 | 706 | 80 | 906 | 100 |
| n1 | 15 | 5 | 10 | 15 | 20 | 256 | 306 |  | 406 | 4512 | 506 |  |  |  |  |  |
| 30 |  | 10 | 15 | 20 | 256 | 306 |  | 406 | 4512 | 506 |  |  |  |  |  |
| 60 |  | 10 | 15 | 20 | 256 | 306 |  | 406 | 4512 | 506 |  |  |  |  |  |
| n2 | 15 | 5 | 10 | 15 | 20 | 25 | 30 |  | 40 |  |  |  |  |  |  |  |
| 30 |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  |  |  |  |  |  |  |
| 60 |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  |  |  |  |  |  |  |
| n3 | 15 | 5 | 10 | 15 | 20 | 25 | 30 | 3512 | 40 | 4512 | 50 |  |  |  |  |  |
| 30 |  | 10 | 15 | 20 | 25 | 30 | 3512 | 40 | 4512 | 50 |  |  |  |  |  |
| 60 |  | 10 | 15 | 20 | 25 | 30 | 3512 | 40 | 4512 | 50 |  |  |  |  |  |
| n5 | 15 | 5 | 10 | 15 | 20 | 253 |  |  |  |  |  |  |  |  |  |  |
| 30 |  | 10 | 15 | 20 | 253 |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n7 | 15 | 5 | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 |  |  |  |  |  |
| 30 |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 |  |  |  |  |  |
| 60 |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 |  |  |  |  |  |
| n8 | 15 | 5 | 10 | 15 | 20 |  |  | 353,12 |  |  |  |  |  |  |  |  |
| 30 |  | 10 | 15 | 20 |  |  | 353,12 |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n12 | 15 | 5 | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 |  | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n13 | 15 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 |  | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n1411 | 15 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 |  | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 15 | 5 | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  |
| n18 | 30 |  | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n20 | 15 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
| 30 |  | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n24 | 15 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 |  | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n25 | 15 | 5 | 10 | 15 | 20 | 256 | 306 | 3512 | 406 | 453,12 |  |  |  |  |  |  |
| 30 |  | 10 | 15 | 20 | 256 | 306 | 3512 | 406 | 453,12 |  |  |  |  |  |  |
| 60 |  | 10 | 15 | 20 | 256 | 306 | 3512 | 406 | 453,12 |  |  |  |  |  |  |
| n26 | 15 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
| 30 |  | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
| n28 | 15 | 5 | 10 | 15 | 209 |  | 306,9 |  |  |  |  |  |  |  |  |  |
| 30 |  | 10 | 15 | 209 |  | 306,9 |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n29 | 15 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 |  | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n30 | 15 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 |  | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n34 | 15 | 5 | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 |  | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  |
| n3811 | 15 | 5 | 10 | 15 | 20 | 25 | 30 |  | 40 |  |  |  |  |  |  |  |
| 30 |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  |  |  |  |  |  |  |
| 60 |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  |  |  |  |  |  |  |
| n39 | 15 | 5 | 10 | 15 | 20 | 25 | 30 |  | 40 |  |  |  |  |  |  |  |
| 30 |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  |  |  |  |  |  |  |
| 60 |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  |  |  |  |  |  |  |
| n40 | 15 | 57 | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 |  |  |  |  |  |
| 30 |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 | 60 |  | 80 |  |  |
| 60 |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 | 60 |  | 80 |  |  |
| n41 | 15 |  | 10 | 15 | 20 |  | 30 |  | 40 |  | 50 |  |  |  |  |  |
| 30 |  | 10 | 15 | 20 |  | 30 |  | 40 |  | 50 | 60 | 70 | 80 | 90 | 100 |
| 60 |  | 10 | 15 | 20 |  | 30 |  | 40 |  | 50 | 60 | 70 | 80 | 90 | 100 |
| n46 | 15 |  | 107 |  | 20 |  |  |  | 40 |  |  |  |  |  |  |  |
| 30 |  | 107 |  | 20 |  |  |  | 40 |  |  | 60 |  | 80 |  |  |
| 60 |  | 107 |  | 20 |  |  |  | 40 |  |  | 60 |  | 80 |  |  |
| n4711 | 15 |  | 10 |  | 20 |  | 30 |  | 40 |  |  |  |  |  |  |  |
| 30 |  | 10 |  | 20 |  | 30 |  | 40 |  |  |  |  |  |  |  |
| 60 |  | 10 |  | 20 |  | 30 |  | 40 |  |  |  |  |  |  |  |
| n48 | 15 | 57 | 10 | 15 | 20 |  | 30 |  | 40 |  | 508 |  |  |  |  |  |
| 30 |  | 10 | 15 | 20 |  | 30 |  | 40 |  | 508 | 608 | 708 | 808 | 908,10 | 1008 |
| 60 |  | 10 | 15 | 20 |  | 30 |  | 40 |  | 508 | 608 | 708 | 808 | 908,10 | 1008 |
| n50 | 15 | 57 | 10 | 15 | 20 |  |  |  | 40 |  | 50 |  |  |  |  |  |
| 30 |  | 10 | 15 | 20 |  |  |  | 40 |  | 50 | 60 |  | 803 |  |  |
| 60 |  | 10 | 15 | 20 |  |  |  | 40 |  | 50 | 60 |  | 803 |  |  |
| n51 | 15 | 5 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n53 | 15 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 |  | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n65 | 15 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
| 30 |  | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
| n66 | 15 | 5 | 10 | 15 | 20 | 256 | 306 |  | 40 |  |  |  |  |  |  |  |
| 30 |  | 10 | 15 | 20 | 256 | 306 |  | 40 |  |  |  |  |  |  |  |
| 60 |  | 10 | 15 | 20 | 256 | 306 |  | 40 |  |  |  |  |  |  |  |
| n70 | 15 | 5 | 10 | 15 | 203 | 253 |  |  |  |  |  |  |  |  |  |  |
| 30 |  | 10 | 15 | 203 | 253 |  |  |  |  |  |  |  |  |  |  |
| 60 |  | 10 | 15 | 203 | 253 |  |  |  |  |  |  |  |  |  |  |
| n71 | 15 | 5 | 10 | 15 | 20 | 253 | 303 | 353,12 |  |  |  |  |  |  |  |  |
| 30 |  | 10 | 15 | 20 | 253 | 303 | 353,12 |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n74 | 15 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
| 30 |  | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
| n75 | 15 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
| 30 |  | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
| n76 | 15 | 5 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n77 | 15 |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 |  |  |  |  |  |
| 30 |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 | 60 | 7010 | 80 | 9010 | 100 |
| 60 |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 | 60 | 7010 | 80 | 9010 | 100 |
| n78 | 15 |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 |  |  |  |  |  |
| 30 |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 | 60 | 7010 | 80 | 90 | 100 |
| 60 |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 | 60 | 7010 | 80 | 90 | 100 |
| n7911 | 15 |  | 10 |  | 20 |  |  |  | 40 |  | 50 |  |  |  |  |  |
| 30 |  | 10 |  | 20 |  |  |  | 40 |  | 50 | 60 |  | 80 |  | 100 |
| 60 |  | 10 |  | 20 |  |  |  | 40 |  | 50 | 60 |  | 80 |  | 100 |
| n80 | 15 | 5 | 10 | 15 | 20 | 25 | 30 |  |  |  |  |  |  |  |  |  |
| 30 |  | 10 | 15 | 20 | 25 | 30 |  |  |  |  |  |  |  |  |  |
| 60 |  | 10 | 15 | 20 | 25 | 30 |  |  |  |  |  |  |  |  |  |
| n81 | 15 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
| 30 |  | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n82 | 15 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
| 30 |  | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n83 | 15 | 5 | 10 | 15 | 209 |  | 309 |  |  |  |  |  |  |  |  |  |
| 30 |  | 10 | 15 | 209 |  | 309 |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n84 | 15 | 5 | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 |  |  |  |  |  |
| 30 |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 |  |  |  |  |  |
| 60 |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 |  |  |  |  |  |
| n86 | 15 | 5 | 10 | 15 | 20 |  |  |  | 40 |  |  |  |  |  |  |  |
| 30 |  | 10 | 15 | 20 |  |  |  | 40 |  |  |  |  |  |  |  |
| 60 |  | 10 | 15 | 20 |  |  |  | 40 |  |  |  |  |  |  |  |
| n91 | 15 | 5 | 1013 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n92 | 15 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
| 30 |  | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n93 | 15 | 5 | 1013 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n94 | 15 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
| 30 |  | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n95 | 15 | 5 | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 |  | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  |
| n96 | 15 |  |  |  | 20 |  |  |  | 40 |  |  |  |  |  |  |  |
| 30 |  |  |  | 20 |  |  |  | 40 |  |  | 60 |  | 80 |  |  |
| 60 |  |  |  | 20 |  |  |  | 40 |  |  | 60 |  | 80 |  |  |
| n97 | 15 | 5 | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 |  |  |  |  |  |
| 30 |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 | 60 | 70 | 80 | 90 | 100 |
| 60 |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 | 60 | 70 | 80 | 90 | 100 |
| n99 | 15 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 |  | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n100 | 15 | 5 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n101 | 15 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 |  | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| NOTE 1: Void.  NOTE 2: Void.  NOTE 3: This UE channel bandwidth is applicable only to downlink.  NOTE 4: For test configuration tables from the transmitter and receiver tests in Section 6 and 7 that refer to this table for test SCS, the Lowest SCS refers to lowest supported SCS per channel bandwidth, Highest SCS refers to highest supported SCS per channel bandwidth.  NOTE 5: For test configuration tables from the transmitter and receiver tests in Section 6 and 7 that refer to this table and list and list the test SCS as Mid or any other value; if that value is not supported by the UE in UL and/or DL, select the closest SCS supported by the UE in both UL and DL.  NOTE 6: This UE channel bandwidth is optional in R15.  NOTE 7: For this bandwidth, the minimum requirements are restricted to operation when carrier is configured as an SCell part of DC or CA configuration.  NOTE 8: For this bandwidth, the minimum requirements are restricted to operation when carrier is configured as a downlink SCell part of CA configuration.  NOTE 9: For the 20 MHz bandwidth, the minimum requirements are specified for NR UL carrier frequencies confined to either 713-723 MHz or 728-738 MHz. For the 30MHz bandwidth, the minimum requirements are specified for NR UL transmission bandwidth configuration confined to either 703-733 or 718-748 MHz.  NOTE 10: This UE channel bandwidth is optional in R16.  NOTE 11: For this band, UE channel bandwidths which are applicable to sidelink operation are specified in Table 5.3E.1-1.  NOTE 12: This UE channel bandwidth is optional in R17.  NOTE 13: This UE channel bandwidth is applicable only to uplink. | | | | | | | | | | | | | | | | |

### 5.3.6 Asymmetric channel bandwidths

The UE channel bandwidth can be asymmetric in downlink and uplink. In asymmetric channel bandwidth operation, the narrower carrier shall be confined within the frequency range of the wider channel bandwidth.

In FDD, the confinement is defined as a maximum deviation to the default Tx-Rx carrier centre frequency separation (defined in Table 5.4.4-1) as following:

ΔFTX-RX = | (BWDL – BWUL)/2 |

The operating bands and supported asymmetric channel bandwidth combinations are defined in Table 5.3.6-1.

Table 5.3.6-1: FDD asymmetric UL and DL channel bandwidth combinations

|  |  |  |  |
| --- | --- | --- | --- |
| NR Band | Channel bandwidths for UL (MHz) | Channel bandwidths for DL (MHz) | Asymmetric channel bandwidth combination set |
| n5 | 20 | 25 | 0 |
| n8 | 20 | 35 | 0 |
| n24 | 10 | 5 | 0 |
| n25 | 40 | 45 | 0 |
| n66 | 5, 10 | 20, 40 | 0 |
| 20 | 40 |
| 5, 10 | 20, 25, 30, 40 | 1 |
| 20, 25, 30 | 40 |
| n70 | 5,10 | 15 | 0 |
| 5, 10, 15 | 20, 25 |
| n71 | 5 | 10 | 0 |
| 10 | 15 |
| 15 | 20 |
|  | 20 | 25, 30, 35 | 2 |
| n911 | 10 | 5 | 0 |
| n921 | 5 | 10, 15, 20 | 0 |
|  | 10 | 15, 20 |  |
| n931 | 10 | 5 | 0 |
| n941 | 5 | 10, 15, 20 | 0 |
|  | 10 | 15, 20 |  |
| NOTE 1: The assignment of the paired UL and DL channels are subject to a TX-RX separation as specified in clause 5.4.4.  NOTE 2: As indicated in TS38.306 [26], it is mandatory for UEs to support asymmetric channel BCS0 if there is an asymmetric BCS0 defined for the band. | | | |

In TDD, the operating bands and supported asymmetric channel bandwidth combinations are defined in Table 5.3.6-2.

Table 5.3.6-2: TDD asymmetric UL and DL channel bandwidth combinations

|  |  |  |
| --- | --- | --- |
| NR Band | Channel bandwidths for UL (MHz) | Channel bandwidths for DL (MHz) |
| n50 | 60 | 80 |
| NOTE 1: Both centre frequency and BWP-ID shall match between DL and UL carriers as defined in TS 38.331 [6] cl. 6.3.2 and TS 38.213 [9] clause 12.  NOTE 2: In a case a UE is configured with a full width of BWP within both UL/ DL channels, the centre frequency of UL/ DL channels shall be same.  NOTE 3: A position of Point A is common between UL and DL carriers as defined in TS 38.331 [6] cl. 6.3.2. | | |

## 5.3A UE channel bandwidth for CA

### 5.3A.1 General

Figure 5.3A.1-1: Void

Figure 5.3A.1-2: Void

### 5.3A.2 Maximum transmission bandwidth configuration for CA

For carrier aggregation, the maximum transmission bandwidth configuration is defined per component carrier and the requirement is specified in subclause 5.3.2.

### 5.3A.3 Minimum guard band and transmission bandwidth configuration for CA

For intra-band contiguous carrier aggregation, *Aggregated Channel Bandwidth* and *Guard Bands* are defined as follows, see Figure 5.3A.3-1.



Figure 5.3A.3-1: Definition of *Aggregated Channel Bandwidth* for intra-band carrier aggregation

The *aggregated channel bandwidth,* BWChannel\_CA, is defined as

BWChannel\_CA = Fedge,high - Fedge,low (MHz).

The lower bandwidth edge Fedge, low and the upper bandwidth edge Fedge,high of the aggregated channel bandwidth are used as frequency reference points for transmitter and receiver requirements and are defined by

Fedge,low = FC,low - Foffset,low

Fedge,high = FC,high + Foffset,high

The lower and upper frequency offsets depend on the transmission bandwidth configurations of the lowest and highest assigned edge component carrier and are defined as

Foffset,low = (NRB,low\*12 + 1)\*SCSlow/2 + BWGB (MHz)

Foffset,high = (NRB,high\*12 - 1)\*SCShigh/2 + BWGB (MHz)

BWGB = max(BWGB,Channel(k))

NRB,low and NRB,high are the transmission bandwidth configurations according to Table 5.3.2-1 for the lowest and highest assigned component carrier, SCSlow and SCShigh are the sub-carrier spacing for the lowest and highest assigned component carrier respectively. SCSlow, SCShigh, NRB,low, NRB,high, and BWGB,Channel(k) use the largest μ value among the subcarrier spacing configurations supported in the operating band for both of the channel bandwidths according to Table 5.3.5-1 and BWGB,Channel(k) is the minimum guard band for carrier k according to Table 5.3.3-1 for the said *μ* value. In case there is no common μ value for both of the channel bandwidths, *μ*=1 is used for SCSlow, SCShigh, NRB,low, NRB,high, and BWGB,Channel(k).

For intra-band non-contiguous carrier aggregation *Sub-block Bandwidth* and *Sub-block edges* are defined as follows, see Figure 5.3A.3-2.

Figure 5.3A.3-2: Definition of sub-block bandwidth for intra-band non-contiguous spectrum

The lower sub-block edge of the Sub-block Bandwidth (BWChannel,block) is defined as

Fedge,block, low = FC,block,low - Foffset, low.

The upper sub-block edge of the Sub-block Bandwidth is defined as

Fedge,block,high = FC,block,high + Foffset,high.

The Sub-block Bandwidth, BWChannel,block, is defined as follows:

BWChannel,block = Fedge,block,high - Fedge,block,low (MHz)

The lower and upper frequency offsets Foffset,block,low and Foffset,block,high depend on the transmission bandwidth configurations of the lowest and highest assigned edge component carriers within a sub-block and are defined as

Foffset,block,low = (NRB,low\*12 + 1)\*SCSlow/2 + BWGB (MHz)

Foffset,block,high = (NRB,high\*12 - 1)\*SCShigh/2 + BWGB(MHz)

BWGB = max(BWGB,Channel(k))

where NRB,low and NRB,high are the transmission bandwidth configurations according to Table 5.3.2-1 for the lowest and highest assigned component carrier within a sub-block, respectively. SCSlow and SCShigh are the sub-carrier spacing for the lowest and highest assigned component carrier within a sub-block, respectively. SCSlow, SCShigh, NRB,low, NRB,high, and BWGB,Channel(k) use the largest μ value among the subcarrier spacing configurations supported in the operating band for both of the channel bandwidths according to Table 5.3.5-1 and BWGB,Channel(k) is the minimum guard band for carrier k according to Table 5.3.3-1 for the said *μ* value. In case there is no common μ value for both of the channel bandwidths, *μ*=1 is used for SCSlow, SCShigh, NRB,low, NRB,high, and BWGB,Channel(k).

The sub-block gap size between two consecutive sub-blocks Wgap is defined as

Wgap = Fedge,block n+1,low - Fedge,block n,high (MHz)

### 5.3A.4 Void

### 5.3A.5 UE channel bandwidth per operating band for CA

The requirements for carrier aggregation in this specification are defined for carrier aggregation configurations.

For intra-band contiguous carrier aggregation, a carrier aggregation configuration is a single operating band supporting a carrier aggregation bandwidth class with associated bandwidth combination sets specified in clause 5.5A.1. For each carrier aggregation configuration, requirements are specified for all aggregated channel bandwidths contained in a bandwidth combination set, a UE can indicate support of several bandwidth combination sets per carrier aggregation configuration. For intra-band non-contiguous carrier aggregation, a carrier aggregation configuration is a single operating band supporting two or more sub-blocks, each supporting a carrier aggregation bandwidth class.

For intra-band non-contiguous uplink carrier aggregation, frequency separation class (Fs) specified in Table 5.3A.5-2 indicates the maximum frequency span between lower edge of lowest component carrier and upper edge of highest component carrier that UE can support per band combination in uplink in non-contiguous intra-band operation when the signalling is absent for dualPA-Architecture IE.

For inter-band carrier aggregation, a carrier aggregation configuration is a combination of operating bands, each supporting a carrier aggregation bandwidth class.

Table 5.3A.5-1: NR CA bandwidth classes

|  |  |  |  |
| --- | --- | --- | --- |
| NR CA bandwidth class | Aggregated channel bandwidth | Number of contiguous CC | Fallback group |
| A | BWChannel ≤ BWChannel,max | 1 | 1, 2, 34 |
| B | 20 MHz ≤ BWChannel\_CA ≤ 100 MHz | 2 | 2, 34 |
| C | 100 MHz < BWChannel\_CA ≤ 2 x BWChannel,max | 2 | 1, 34 |
| D | 200 MHz < BWChannel\_CA ≤ 3 x BWChannel,max | 3 |
| E | 300 MHz < BWChannel\_CA ≤ 4 x BWChannel,max | 4 |
| G | 100 MHz < BWChannel\_CA ≤ 150 MHz | 3 | 2 |
| H | 150 MHz < BWChannel\_CA ≤ 200 MHz | 4 |
| I | 200 MHz < BWChannel\_CA ≤ 250 MHz | 5 |
| J | 250 MHz < BWChannel\_CA ≤ 300 MHz | 6 |
| K | 300 MHz < BWChannel\_CA ≤ 350 MHz | 7 |
| L | 350 MHz < BWChannel\_CA ≤ 400 MHz | 8 |
| M3 | 50 MHz ≤ BWChannel\_CA ≤ 200 MHz | 3 | 34 |
| N3 | 80 MHz ≤ BWChannel\_CA ≤ 300 MHz | 4 |
| O3 | 100 MHz ≤ BWChannel\_CA ≤ 400 MHz | 5 |
| NOTE 1: BWChannel,max is maximum channel bandwidth supported among all bands in a release  NOTE 2: It is mandatory for a UE to be able to fallback to lower order NR CA bandwidth class configuration within a fallback group. It is not mandatory for a UE to be able to fallback to lower order NA CA bandwidth class configuration that belong to a different fallback group.  NOTE 3: This bandwidth class is only applicable to bands identified for use with shared spectrum channel access in Table 5.2-1.  NOTE 4: Fallback group 3 is only applicable to bands identified for use with shared spectrum channel access in Table 5.2-1. | | | |

Table 5.3A.5-2: NR intra-band non-contiguous UL CA frequency separation classes

|  |  |
| --- | --- |
| NR NC CA frequency separation class | Maximum allowed frequency separation |
| I | 100 MHz |
| II | 200 MHz |
| III | [600MHz] |

## 5.3E Channel bandwidth for V2X

### 5.3E.1 General

NR V2X operation channel bandwidths for each operating band are specified in Table 5.3E.1-1 in subclause 5.3E.1. The same (symmetrical) channel bandwidth is specified for both the transmission and reception path. The maximum channel bandwidth for SL operation in licensed band is 40MHz.

Table 5.3E.1-1: NR V2X operation channel bandwidths for each operating band

| NR band / SCS / UE Channel bandwidth (MHz) | | | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| NR Band | SCS  (kHz) | 5 | 10 | 20 | 30 | 40 |
| n38 | 15 |  | 10 | 20 | 30 | 40 |
|  | 30 |  | 10 | 20 | 30 | 40 |
|  | 60 |  | 10 | 20 | 30 | 40 |
| n47 | 15 |  | 10 | 20 | 30 | 40 |
|  | 30 |  | 10 | 20 | 30 | 40 |
|  | 60 |  | 10 | 20 | 30 | 40 |

### 5.3E.2 Channel bandwidth for V2X concurrent operation

For NR V2X inter-band con-current operation in FR1, the NR V2X channel bandwidths for each operating band are specified in Table 5.3E.2-1.

Table 5.3E.2-1: Inter-band con-current V2X configurations

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NR V2X inter-band con-current operating configuration | NR Band | Interface | Channel bandwidth (MHz) (NOTE 1) | Bandwidth combination set |
| V2X\_n71A-n47A | n71 | Uu | 5, 10, 15, 20 | 0 |
|  | n47 | PC5 | 10, 20, 30, 40 |  |
| NOTE 1: The SCS of each channel bandwidth for NR band refers to Table 5.3.5-1. | | | | |

## 5.3I Channel bandwidth for RedCap

The requirements in this specification apply to the combination of channel bandwidths, SCS and operating bands shown in Table 5.3.5-1 with maximum channel bandwidth of 20MHz. The transmission bandwidth configuration in Table 5.3.2-1 shall be supported for each of the specified channel bandwidths up to 20 MHz. The channel bandwidths are specified for both the TX and RX path.

## 5.4 Channel arrangement

### 5.4.1 Channel spacing

#### 5.4.1.1 Channel spacing for adjacent NR carriers

The spacing between carriers will depend on the deployment scenario, the size of the frequency block available and the channel bandwidths. The nominal channel spacing between two adjacent NR carriers is defined as following:

- For NR operating bands with 100 kHz channel raster,

Nominal Channel spacing = (BWChannel(1) + BWChannel(2))/2

- For NR operating bands with 15 kHz channel raster,

Nominal Channel spacing = (BWChannel(1) + BWChannel(2))/2+{-5kHz, 0kHz, 5kHz}} for ∆FRaster equals 15 kHz

Nominal Channel spacing = (BWChannel(1) + BWChannel(2))/2+{-10 kHz, 0 kHz, 10 kHz} for ∆FRaster equals 30 kHz

where BWChannel(1) and BWChannel(2) are the channel bandwidths of the two respective NR carriers. The channel spacing can be adjusted depending on the channel raster to optimize performance in a particular deployment scenario.

### 5.4.2 Channel raster

#### 5.4.2.1 NR-ARFCN and channel raster

The global frequency channel raster defines a set of RF reference frequencies FREF. The RF reference frequency is used in signalling to identify the position of RF channels, SS blocks and other elements.

The global frequency raster is defined for all frequencies from 0 to 100 GHz. The granularity of the global frequency raster is ΔFGlobal.

RF reference frequencies are designated by an NR Absolute Radio Frequency Channel Number (NR-ARFCN) in the range (0…2016666) on the global frequency raster. The relation between the NR-ARFCN and the RF reference frequency FREF in MHz is given by the following equation, where FREF-Offs and NRef-Offs are given in Table 5.4.2.1-1 and NREF is the NR-ARFCN.

FREF = FREF-Offs + ΔFGlobal (NREF – NREF-Offs)

Table 5.4.2.1-1: NR-ARFCN parameters for the global frequency raster

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Frequency range (MHz) | ΔFGlobal (kHz) | FREF-Offs (MHz) | NREF-Offs | Range of NREF |
| 0 – 3000 | 5 | 0 | 0 | 0 – 599999 |
| 3000 – 24250 | 15 | 3000 | 600000 | 600000 – 2016666 |

The channel raster defines a subset of RF reference frequencies that can be used to identify the RF channel position in the uplink and downlink. The RF reference frequency for an RF channel maps to a resource element on the carrier. For each operating band, a subset of frequencies from the global frequency raster are applicable for that band and forms a channel raster with a granularity ΔFRaster, which may be equal to or larger than ΔFGlobal.

For SUL expect n95, n97 bands and for the uplink of all FDD bands defined in Table 5.2-1, and for TDD bands n34, n39, n48, n90 and n38,.

FREF, shift = FREF + Δshift, Δshift=0kHz or 7.5 kHz.

where Δshift is signalled by the network in higher layer parameter frequencyShift7p5khz [6]. For Band n34, n38, n39, n48, FREF, shift is only applicable to uplink transmissions using a 15 kHz SCS.

The mapping between the channel raster and corresponding resource element is given in Section 5.4.2.2. The applicable entries for each operating band are defined in Section 5.4.2.3

#### 5.4.2.2 Channel raster to resource element mapping

The mapping between the RF reference frequency on the channel raster and the corresponding resource element is given in Table 5.4.2.2-1 and can be used to identify the RF channel position. The mapping depends on the total number of RBs that are allocated in the channel and applies to both UL and DL. The mapping must apply to at least one numerology supported by the UE.

Table 5.4.2.2-1: Channel raster to resource element mapping

|  |  |  |
| --- | --- | --- |
|  | NRBmod2 = 0 | NRBmod2 = 1 |
| Resource element index | 0 | 6 |
| Physical resource block number |  |  |

, *nPRB*, *NRB* are as defined in TS 38.211[8].

#### 5.4.2.3 Channel raster entries for each operating band

The RF channel positions on the channel raster in each NR operating band are given through the applicable NR-ARFCN in Table 5.4.2.3-1, using the channel raster to resource element mapping in subclause 5.4.2.2.

For NR operating bands with 100 kHz channel raster, ΔFRaster = 20 × ΔFGlobal. In this case every 20th NR-ARFCN within the operating band are applicable for the channel raster within the operating band and the step size for the channel raster in Table 5.4.2.3-1 is given as <20>.

For NR operating bands with 15 kHz channel raster below 3GHz, ΔFRaster = *I* × ΔFGlobal, where *I ϵ {3,6}*. Every *Ith* NR‑ARFCN within the operating band are applicable for the channel raster within the operating band and the step size for the channel raster in Table 5.4.2.3‑1 is given as < *I* >.

For NR operating bands with 15 kHz channel raster above 3GHz, ΔFRaster = *I* × ΔFGlobal, where *I ϵ {1,2}.* Every *Ith* NR‑ARFCN within the operating band are applicable for the channel raster within the operating band and the step size for the channel raster in table 5.4.2.3-1 is given as <*I*>.

In frequency bands with two or more ΔFRaster: For 15 kHz and 30 kHz channel raster,the higher ΔFRaster applies to channels using only the SCS that is equals to or larger than the higher ΔFRaster and SSB SCS is equal to the higher ∆FRaster.

Table 5.4.2.3-1: Applicable NR-ARFCN per operating band

|  |  |  |  |
| --- | --- | --- | --- |
| NR operating band | ΔFRaster  (kHz) | Uplink  Range of NREF  (First – <Step size> – Last) | Downlink  Range of NREF  (First – <Step size> – Last) |
| n1 | 100 | 384000 – <20> – 396000 | 422000 – <20> – 434000 |
| n2 | 100 | 370000 – <20> – 382000 | 386000 – <20> – 398000 |
| n3 | 100 | 342000 – <20> – 357000 | 361000 – <20> – 376000 |
| n5 | 100 | 164800 – <20> – 169800 | 173800 – <20> – 178800 |
| n7 | 100 | 500000 – <20> – 514000 | 524000 – <20> – 538000 |
| n8 | 100 | 176000 – <20> – 183000 | 185000 – <20> – 192000 |
| n12 | 100 | 139800 – <20> – 143200 | 145800 – <20> – 149200 |
| n13 | 100 | 155400 – <20> – 157400 | 149200 – <20> – 151200 |
| n14 | 100 | 157600 – <20> – 159600 | 151600 – <20> – 153600 |
| n20 | 100 | 166400 – <20> – 172400 | 158200 – <20> – 164200 |
| n24 | 100 | 325300 – <20> – 332100 | 305000 – <20> – 311800 |
| n25 | 100 | 370000 – <20> – 383000 | 386000 – <20> – 399000 |
| n26 | 100 | 162800 – <20> – 169800 | 171800 – <20> – 178800 |
| n28 | 100 | 140600 – <20> – 149600 | 151600 – <20> – 160600 |
| n29 | 100 | N/A | 143400 – <20> – 145600 |
| n30 | 100 | 461000 – <20> – 463000 | 470000 – <20> – 472000 |
| n34 | 100 | 402000 – <20> – 405000 | 402000 – <20> – 405000 |
| n38 | 100 | 514000 – <20> – 524000 | 514000 – <20> – 524000 |
| n39 | 100 | 376000 – <20> – 384000 | 376000 – <20> – 384000 |
| n40 | 100 | 460000 – <20> – 480000 | 460000 – <20> – 480000 |
| n41 | 15 | 499200 – <3> – 537999 | 499200 – <3> – 537999 |
| 30 | 499200 – <6> – 537996 | 499200 – <6> – 537996 |
| n462 | 15 | 743334 – <1> – 795000 | 743334 – <1> – 795000 |
| n47 | 15 | 790334 – <1> – 795000 | 790334 – <1> – 795000 |
| n48 | 15 | 636667 – <1> – 646666 | 636667 – <1> – 646666 |
| 30 | 636668 – <2> – 646666 | 636668 – <2> – 646666 |
| n50 | 100 | 286400 – <20> – 303400 | 286400 – <20> – 303400 |
| n51 | 100 | 285400 – <20> – 286400 | 285400 – <20> – 286400 |
| n53 | 100 | 496700 – <20> – 499000 | 496700 – <20> – 499000 |
| n65 | 100 | 384000 – <20> – 402000 | 422000 – <20> – 440000 |
| n66 | 100 | 342000 – <20> – 356000 | 422000 – <20> – 440000 |
| n70 | 100 | 339000 – <20> – 342000 | 399000 – <20> – 404000 |
| n71 | 100 | 132600 – <20> – 139600 | 123400 – <20> – 130400 |
| n75 | 100 | N/A | 286400 – <20> – 303400 |
| n76 | 100 | N/A | 285400 – <20> – 286400 |
| n77 | 15 | 620000 – <1> – 680000 | 620000 – <1> – 680000 |
| 30 | 620000 – <2> – 680000 | 620000 – <2> – 680000 |
| n78 | 15 | 620000 – <1> – 653333 | 620000 – <1> – 653333 |
| 30 | 620000 – <2> – 653332 | 620000 – <2> – 653332 |
| n79 | 15 | 693334 – <1> – 733333 | 693334 – <1> – 733333 |
| 30 | 693334 – <2> – 733332 | 693334 – <2> – 733332 |
| n80 | 100 | 342000 – <20> – 357000 | N/A |
| n81 | 100 | 176000 – <20> – 183000 | N/A |
| n82 | 100 | 166400 – <20> – 172400 | N/A |
| n83 | 100 | 140600 – <20> –149600 | N/A |
| n84 | 100 | 384000 – <20> – 396000 | N/A |
| n86 | 100 | 342000 – <20> – 356000 | N/A |
| n91 | 100 | 166400 – <20> – 172400 | 285400 – <20> – 286400 |
| n92 | 100 | 166400 – <20> – 172400 | 286400 – <20> – 303400 |
| n93 | 100 | 176000 – <20> – 183000 | 285400 – <20> – 286400 |
| n94 | 100 | 176000 – <20> – 183000 | 286400 – <20> – 303400 |
| n95 | 100 | 402000 – <20> – 405000 | N/A |
| n963 | 15 | 795000 – <1> – 875000 | 795000 – <1> – 875000 |
| n97 | 100 | 460000 – <20> – 480000 | N/A |
| n99 | 100 | 325300 – <20> – 332100 | N/A |
| n100 | 100 | 174880 – <20> – 176000 | 183880 – <20> – 185000 |
| n101 | 100 | 380000 – <20> – 382000 | 380000 – <20> – 382000 |
| NOTE 1: The channel numbers that designate carrier frequencies so close to the operating band edges that the carrier extends beyond the operating band edge shall not be used.  NOTE 2: The following NREF are allowed for operation in Band n46: see Table 5.4.2.3-2.  NOTE 3: The following NREF are allowed for operation in Band n96: see Table 5.4.2.3-3. | | | |

Table 5.4.2.3-2: Allowed NREF (NR-ARFCN) for operation in Band n46

|  |  |
| --- | --- |
| Channel Bandwidth | Allowed NREF |
| 10 MHz | 782000, 788668 |
| 20 MHz | 744000, 745332, 746668, 748000, 749332, 750668, 752000, 753332, 754668, 756000, 765332, 766668, 768000, 769332, 770668, 772000, 773332, 774668, 776000, 777332, 778668, 780000, 781332, 783000, 784332, 785668, 787000, 788332, 789668, 791000, 792332, 793668 |
| 40 MHz | 744668, 746000, 748668, 751332, 754000, 755332, 766000, 767332, 770000, 772668, 775332, 778000, 780668, 783668, 786332, 787668, 790332, 793000 |
| 60 MHz | 745332, 746668, 748000, 752000, 753332, 754668, 766668, 768000, 769332, 773332, 774668, 778668, 780000, 784332, 785668, 787000, 791000, 792332 |
| 80 MHz | 746000, 747332, 752668, 754000, 767332, 768668, 774000, 779332, 785000, 786332, 791668 |
| NOTE: 10 MHz channel bandwidth shall only apply in certain regions where the absence of non 3GPP technologies can be guaranteed on a long-term basis in this version of specification. | |

Table 5.4.2.3-3: Allowed NREF (NR-ARFCN) for operation in Band n96

|  |  |
| --- | --- |
| Channel Bandwidth | Allowed NREF |
| 20 MHz | 797000, 798332, 799668, 801000, 802332, 803668, 805000, 806332, 807668, 809000, 810332, 811668, 813000, 814332,  815668, 817000, 818332, 819668, 821000, 822332, 823668, 825000, 826332, 827668, 829000, 830332, 831668, 833000, 834332, 835668, 837000, 838332, 839668, 841000, 842332, 843668, 845000, 846332, 847668, 849000, 850332, 851668, 853000, 854332, 855668, 857000, 858332, 859668, 861000, 862332, 863668, 865000, 866332, 867668, 869000, 870332, 871668, 873000, 874332 |
| 40 MHz | 797668, 800332, 803000, 805668, 808332, 811000, 813668, 816332, 819000, 821668, 824332, 827000, 829668, 832332, 835000, 837668, 840332, 843000, 845668, 848332, 851000, 853668, 856332, 859000, 861668, 864332, 867000, 869668,  872332 |
| 60 MHz | 798332, 799668, 803668, 805000, 809000, 810332, 814332, 815668, 819668, 821000, 825000, 826332, 830332, 831668, 835668, 837000, 841000, 842332, 846332, 847668, 851668, 853000, 857000, 858332, 862332, 863668, 867668, 869000, 873000 |
| 80 MHz | 799000, 804332, 809668, 815000, 820332, 825668, 831000, 836332, 841668, 847000, 852332, 857668, 863000, 868332 |

### 5.4.3 Synchronization raster

#### 5.4.3.1 Synchronization raster and numbering

The synchronization raster indicates the frequency positions of the synchronization block that can be used by the UE for system acquisition when explicit signalling of the synchronization block position is not present.

A global synchronization raster is defined for all frequencies. The frequency position of the SS block is defined as SSREF with corresponding number GSCN. The parameters defining the SSREF and GSCN for all the frequency ranges are in Table 5.4.3.1-1.

The resource element corresponding to the SS block reference frequency SSREF is given in subclause 5.4.3.2. The synchronization raster and the subcarrier spacing of the synchronization block are defined separately for each band.

Table 5.4.3.1-1: GSCN parameters for the global frequency raster

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency range | SS Block frequency position SSREF | GSCN | Range of GSCN |
| 0 – 3000 MHz | N \* 1200kHz + M \* 50 kHz,  N=1:2499, M ϵ {1,3,5} (Note 1) | 3N + (M-3)/2 | 2 – 7498 |
| 3000 - 24250 MHz | 3000 MHz + N \* 1.44 MHz  N = 0:14756 | 7499 + N | 7499 – 22255 |
| NOTE 1: The default value for operating bands with SCS spaced channel raster is M=3. | | | |

#### 5.4.3.2 Synchronization raster to synchronization block resource element mapping

The mapping between the synchronization raster and the corresponding resource element of the SS block is given in Table 5.4.3.2-1.

Table 5.4.3.2-1: Synchronization raster to SS block resource element mapping

|  |  |
| --- | --- |
| Resource element index | 120 |
|  |  |

is the subcarrier number of SS/PBCH block defined in TS 38.211 clause 7.4.3.1[8].

#### 5.4.3.3 Synchronization raster entries for each operating band

The synchronization raster for each band is given in Table 5.4.3.3-1. The distance between applicable GSCN entries is given by the <Step size> indicated in Table 5.4.3.3-1.

Table 5.4.3.3-1: Applicable SS raster entries per operating band

|  |  |  |  |
| --- | --- | --- | --- |
| NR operating band | SS Block SCS | SS Block pattern1 | Range of GSCN  (First – <Step size> – Last) |
| n1 | 15kHz | Case A | 5279 – <1> – 5419 |
| n2 | 15kHz | Case A | 4829 – <1> – 4969 |
| n3 | 15kHz | Case A | 4517 – <1> – 4693 |
| n5 | 15kHz | Case A | 2177 – <1> – 2230 |
| 30kHz | Case B | 2183 – <1> – 2224 |
| n7 | 15kHz | Case A | 6554 – <1> – 6718 |
| n8 | 15kHz | Case A | 2318 – <1> – 2395 |
| n12 | 15kHz | Case A | 1828 – <1> – 1858 |
| n13 | 15kHz | Case A | 1871 – <1> – 1885 |
| n14 | 15 kHz | Case A | 1901 – <1> – 1915 |
| n20 | 15kHz | Case A | 1982 – <1> – 2047 |
| n24 | 15 kHz | Case A | 3818 – <1> – 3892 |
| 30 kHz | Case B | 3824 – <1> – 3886 |
| n25 | 15 kHz | Case A | 4829 – <1> – 4981 |
| n26 | 15 kHz | Case A | 2153 – <1> – 2230 |
| n28 | 15kHz | Case A | 1901 – <1> – 2002 |
| n29 | 15 kHz | Case A | 1798 – <1> – 1813 |
| n30 | 15 kHz | Case A | 5879 – <1> – 5893 |
| n34 | 15kHz | Case A | NOTE5 |
| 30kHz | Case C | 5036– <1> – 5050 |
| n38 | 15kHz | Case A | NOTE 2 |
| 30 kHz | Case C | 6437 – <1> – 6538 |
| n39 | 15kHz | Case A | NOTE 6 |
| 30 kHz | Case C | 4712 – <1> – 4789 |
| n40 | 30kHz | CaseC | 5762 – <1> – 5989 |
| n41 | 15kHz | Case A | 6246 – <3> – 6717 |
| 30 kHz | Case C | 6252 – <3> – 6714 |
| n46**3** | 30 kHz | Case C | 8993 – <1> – 9530 |
| n50 | 30kHz | Case C | 3590 – <1> – 3781 |
| n48 | 30 kHz | Case C | 7884 – <1> – 7982 |
| n51 | 15kHz | Case A | 3572 – <1> – 3574 |
| n53 | 15 kHz | Case A | 6215 – <1> – 6232 |
|  | 30 kHz | Case C | 6221 – <1> – 6226 |
| n65 | 15 kHz | Case A | 5279 – <1> – 5494 |
| n66 | 15kHz | Case A | 5279 – <1> – 5494 |
| 30kHz | Case B | 5285 – <1> – 5488 |
| n70 | 15kHz | Case A | 4993 – <1> – 5044 |
| n71 | 15kHz | Case A | 1547 – <1> – 1624 |
| n74 | 15kHz | Case A | 3692 – <1> – 3790 |
| n75 | 15kHz | Case A | 3584 – <1> – 3787 |
| n76 | 15kHz | Case A | 3572 – <1> – 3574 |
| n77 | 30kHz | Case C | 7711 – <1> – 8329 |
| n78 | 30kHz | Case C | 7711 – <1> – 8051 |
| n79 | 30kHz | Case C | 8480 – <16> – 88807  8475 – <1> – 8884**8** |
| n91 | 15 kHz | Case A | 3572 – <1> – 3574 |
| n92 | 15 kHz | Case A | 3584 – <1> – 3787 |
| n93 | 15 kHz | Case A | 3572 – <1> – 3574 |
| n94 | 15 kHz | Case A | 3584 – <1> – 3787 |
| n96**4** | 30 kHz | Case C | 9531 – <1> – 10363 |
| n100 | 15 kHz | Case A | 2303 – <1> – 2307 |
| n101 | 15 kHz | Case A | 4754 – <1> – 4768 |
| 30 kHz | Case C | 4760 – <1> – 4764 |
| NOTE 1: SS Block pattern is defined in section 4.1 in TS 38.213 [9]  NOTE 2: The applicable SS raster entries are GSCN = {6432, 6443, 6457, 6468, 6479, 6493, 6507, 6518, 6532, 6543}.  NOTE 3: The following GSCN are allowed for operation in band n46:  GSCN = {8996, 9010, 9024, 9038, 9051, 9065, 9079, 9093, 9107, 9121, 9218, 9232, 9246, 9260, 9274, 9288, 9301, 9315, 9329, 9343, 9357, 9371, 9385, 9402, 9416, 9430, 9444, 9458, 9472, 9485, 9499, 9513}.  NOTE 4: The following GSCN are allowed for operation in band n96:  GSCN = {9548, 9562, 9576, 9590, 9603, 9617,9631, 9645, 9659, 9673, 9687, 9701, 9714, 9728, 9742, 9756, 9770, 9784, 9798, 9812, 9826, 9840, 9853, 9867, 9881, 9895, 9909, 9923, 9937, 9951, 9964, 9978, 9992, 10006, 10020, 10034, 10048, 10062, 10076, 10090, 10103, 10117, 10131, 10145, 10159, 10173, 10187, 10201, 10214, 10228, 10242, 10256, 10270, 10284, 10298, 10312, 10325, 10339, 10353}.  NOTE 5: The applicable SS raster entries are GSCN = {5032, 5043, 5054}  NOTE 6: The applicable SS raster entries are GSCN = {4707, 4715, 4718, 4729, 4732, 4743, 4747, 4754, 4761, 4768, 4772, 4782, 4786, 4793}  NOTE 7: The SS raster entries apply for channel bandwidths larger than or equal to 40 MHz  NOTE 8: The SS raster entries apply for channel bandwidths smaller than 40 MHz | | | |

### 5.4.4 TX–RX frequency separation

The default TX channel (carrier centre frequency) to RX channel (carrier centre frequency) separation for operating bands is specified in Table 5.4.4-1.

Table 5.4.4-1: UE TX-RX frequency separation

| NR Operating Band | TX – RX  carrier centre frequency separation |
| --- | --- |
| n1 | 190 MHz |
| n2 | 80 MHz |
| n3 | 95 MHz |
| n5 | 45 MHz |
| n7 | 120 MHz |
| n8 | 45 MHz |
| n12 | 30 MHz |
| n13 | -31 MHz |
| n14 | -30 MHz |
| n20 | -41 MHz |
| n24 | -101.5, -120.5 MHz |
| n25 | 80 MHz |
| n26 | 45 MHz |
| n28 | 55 MHz |
| n30 | 45 MHz |
| n65 | 190 MHz |
| n66 | 400 MHz |
| n70 | 300 MHz |
| n71 | -46 MHz |
| n74 | 48 MHz |
| n91 | 570 MHz – 595 MHz  (NOTE 2) |
| n92 | 575 MHz – 680 MHz (*μ* = 0)  580 MHz – 675 MHz (*μ* = 1)  (NOTE 2) |
| n93 | 517 MHz – 547 MHz  (NOTE 2) |
| n94 | 522 MHz – 632 MHz (*μ* = 0)  527 MHz – 627 MHz (*μ* = 1)  (NOTE 2) |
| n100 | 45MHz |
| NOTE 1: Default TX-RX carrier centre frequency separation.  NOTE 2: The range of TX-RX frequency separation given paired UL and DL channel bandwidths BWUL and BWDL is given by the respective lower and upper limit FDL\_low – FUL\_high + 0.5(BWDL + BWUL) and FDL\_high – FUL\_low – 0.5(BWDL + BWUL). The UL and DL channel bandwidth combinations specified in Table 5.3.5-1 and 5.3.6-1 depend on the subcarrier spacing configuration *μ* [6]. | |

## 5.4A Channel arrangement for CA

### 5.4A.1 Channel spacing for CA

For intra-band contiguous carrier aggregation with two or more component carriers, the nominal channel spacing between two adjacent NR component carriers is defined as the following unless stated otherwise:

For NR operating bands with a 100 kHz channel raster:



while for NR operating bands with 15 kHz channel raster:



with n = µ0

where BWChannel(1) and BWChannel(2) are the channel bandwidths of the two respective NR component carriers according to Table 5.3.2-1 with values in MHz, *μ0* is the largest *μ* value among the subcarrier spacing configurations supported in the operating band for both of the channel bandwidths according to Table 5.3.5-1 and *GBChannel(i)* is the minimum guard band for channel bandwidth i according to Table 5.3.3-1 for the said *μ* value with *μ* as defined in TS 38.211. In case there is no common μ value for both of the channel bandwidths, *μ0*=1 is selected and *GBChannel(i)* is the minimum guard band for channel bandwidth i according to Table 5.3.3-1 for *μ*=1 with *μ* as defined in TS 38.211.

The channel spacing for intra-band contiguous carrier aggregation can be adjusted to any multiple of least common multiple of channel raster and sub-carrier spacing less than the nominal channel spacing to optimize performance in a particular deployment scenario.

For intra-band non-contiguous carrier aggregation, the channel spacing between two NR component carriers in different sub-blocks shall be larger than the nominal channel spacing defined in this subclause

### 5.4A.2 Channel raster for CA

For inter-band and intra-band contiguous carrier aggregation, the channel raster requirements in clause 5.4.2 apply for each operating band.

### 5.4A.3 Synchronization raster for CA

For inter-band and intra-band contiguous carrier aggregation, the synchronization raster requirements in clause 5.4.3 apply for each operating band.

### 5.4A.4 Tx-Rx frequency separation for CA

For inter-band carrier aggregation, the Tx-Rx frequency separation requirements in subclause 5.4.4 apply for each operating band.

For intra-band contiguous carrier aggregation, the same TX-RX frequency separation as specified in Table 5.4.4-1 is applied to PCC and SCC, respectively.

## 5.4E Channel arrangement for V2X

### 5.4E.1 Channel spacing

For NR V2X, the channel spacing requirements in clause 5.4.1 apply for each operating band.

### 5.4E.2 Channel raster

#### 5.4E.2.1 NR-ARFCN and channel raster

For NR V2X, the NR-ARFCN and channel raster requirements in clause 5.4.2.1 apply for each operating band.

For NR V2X UE, the reference frequency can be shifted by configuration.

FREF\_V2X = FREF + Δshift + N \* 5 kHz

where

Δshift = 0 kHz or 7.5 kHz indicated in IE (*frequencyShift7p5khz*), and

N can be set as one of following values {-1, 0, 1}, which are signalled by the network in higher layer parameters or configured by pre-configuration parameters.

#### 5.4E.2.2 Channel raster to resource element mapping

For NR V2X, the channel raster to resource element mapping requirements in clause 5.4.2.2 apply for each operating band.

#### 5.4E.2.3 Channel raster entries for each operating band

For NR V2X, the channel raster entries, the channel raster entries requirements in clause 5.4.2.3 apply for each operating band.

The RF channel positions on the channel raster in each NR V2X operating band are given through the applicable NR-ARFCN in Table 5.4.2.3-1, using the channel raster to resource element mapping in subclause 5.4E.2.2.

For NR V2X operating band n47, ΔFRaster = *I* × ΔFGlobal, where *I ϵ {1}.* Every *Ith* NR‑ARFCN within the operating band are applicable for the channel raster within the operating band and the step size for the channel raster in Table 5.4.2.3-1 is given as <*I*>.

### 5.4E.3 Synchronization raster for V2X

There is no synchronization raster definition for NR V2X for both licensed bands and unlicensed bands.

## 5.5 Void

## 5.5A Configurations for CA

### 5.5A.0 General

The configurations for CA operating band including Band n41 also apply for the corresponding CA operating bands with Band n90 replacing Band n41 but with otherwise identical parameters. For brevity the said configuration for CA operating bands with Band n90 are not listed in the tables below but are covered by this specification.

Non‑contiguous resource allocation and almost contiguous allocation are not applicable for each NR carrier of intra‑band contiguous and non-contiguous CA configurations.

For a CA configuration with one or more operating band supporting asymmetric channel bandwidths as specified in sub-clause 5.3.6, requirements are defined for an asymmetric UL and DL channel bandwidth combination of a supported asymmetric channel bandwidth combination set for an operating band of the CA configuration when the said UL and DL channel bandwidths are also contained in a supported bandwidth combination set of the CA configuration.

### 5.5A.1 Configurations for intra-band contiguous CA

Power class 3 is supported for all uplinks. Power classes other than power class 3 are supported as indicated in Table 5.5A.1-1.

Table 5.5A.1-1: NR CA configurations and bandwidth combination sets defined for intra-band contiguous CA

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR CA configuration / Bandwidth combination set | | | | | | | | |
| NR CA configuration | Uplink CA configuration or single uplink carrier6 | Channel bandwidths for carrier (MHz) | Channel bandwidths for carrier (MHz) | Channel bandwidths for carrier (MHz) | Channel bandwidths for carrier (MHz) | Channel bandwidths for carrier (MHz) | Maximum aggregated  bandwidth (MHz) | Bandwidth combination set |
| CA\_n40B | - | 20 | 80 |  |  |  | 100 | 0 |
| 50 | 50 |  |  |  |
| CA\_n41C4 | n414,5  CA\_n41C | 40 | 80, 100 |  |  |  | 180 | 0 |
| 50, 60, 80 | 60, 80, 100 |  |  |  |
| 10 | 100 |  |  |  | 190 | 1 |
| 15, 20 | 90, 100 |  |  |  |
| 40 | 80, 90, 100 |  |  |  |
| 50, 60, 80, 90 | 60, 80, 90, 100 |  |  |  |
| CA\_n46B | - | 20, 40, 60 | 20, 40 |  |  |  | 100 | 0 |
| CA\_n46C | - | 60, 80 | 60, 80 |  |  |  | 160 | 0 |
| CA\_n46D | - | 60, 80 | 80 | 80 |  |  | 240 | 0 |
| CA\_n46M | - | 20, 40, 60 | 20, 40 | 20, 40 |  |  | 140 | 0 |
| CA\_n46N | - | 20, 40, 80 | 20, 40 | 20, 40 | 20, 40 |  | 200 | 0 |
| CA\_n46O | - | 20, 60 | 20, 40 | 20, 40 | 20, 40 | 20, 40 | 220 | 0 |
| CA\_n48B | CA\_n48B | 5 | 15, 20 |  |  |  | 40 | 0 |
| 10, 15, 20 | 10, 15, 20 |  |  |  |
| 15, 20 | 15, 20 |  |  |  |
| - | 10 | 50, 60, 80, 90 |  |  |  | 100 | 1 |
| 15, 20 | 40, 50, 60, 80 |  |  |  |
| 40 | 40, 50, 60 |  |  |  |
| - | 10, 15, 20, 30, 40 | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90 |  |  |  | 100 | 2 |
|  |  |  |
|  |  |  |
| CA\_n66B | - | 5 2 | 20, 40 |  |  |  | 50 | 0 |
| 10 | 15, 20, 40 |  |  |  |
| 15 | 15, 20 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
| CA\_n77C | CA\_n77C | 50 | 60, 80, 100 |  |  |  | 200 | 0 |
| 60 | 60, 80, 100 |  |  |  |
| 80 | 80, 100 |  |  |  |
| 100 | 100 |  |  |  |
| 10 | 100 |  |  |  | 200 | 1 |
| 15, 20 | 90, 100 |  |  |  |
| 25, 30 | 80, 90, 100 |  |  |  |
| 40 | 70, 80, 90, 100 |  |  |  |
| 50, 60,70, 80,90, 100 | 60, 70,80, 90, 100 |  |  |  |
| CA\_n77D | - | 100 | 100 | 100 |  |  | 300 | 0 |
| CA\_n78B | - | 20 | 50 |  |  |  | 70 | 0 |
| CA\_n78C | CA\_n78C4 | 50 | 60, 80, 100 |  |  |  | 200 | 0 |
| 60 | 60, 80, 100 |  |  |  |
| 80 | 80, 100 |  |  |  |
| 100 | 100 |  |  |  |
| 10 | 100 |  |  |  | 200 | 1 |
| 15, 20 | 90, 100 |  |  |  |
| 25, 30 | 80, 90, 100 |  |  |  |
| 40 | 70, 80, 90, 100 |  |  |  |
| 50, 60, 70, 80, 90, 100 | 60, 70, 80, 90, 100 |  |  |  |
| CA\_n78D | - | 100 | 100 | 100 |  |  | 300 | 0 |
| CA\_n79C | CA\_n79C | 50 | 60, 80, 100 |  |  |  | 200 | 0 |
| 60 | 60, 80, 100 |  |  |  |
| 80 | 80, 100 |  |  |  |
| 100 | 100 |  |  |  |
| CA\_n79D | - | 100 | 100 | 100 |  |  | 300 | 0 |
| NOTE 1: Void.  NOTE 2: 5 MHz is not applicable for 30/60 kHz SCS.  NOTE 3: The aggregated bandwidth must be greater than or equal to the minimum for the bandwidth class defined in Table 5.3A.5-1, and smaller than or equal to the maximum aggregated bandwidth.  NOTE 4: Power Class 2 is allowed for this uplink combination or single uplink carrier in this downlink/uplink combination  NOTE 5: Power Class 1.5 is allowed for this uplink combination or single uplink carrier in this downlink/uplink combination  NOTE 6: Only single uplink carriers with power class other than PC3 are listed. | | | | | | | | |

Table 5.5A.1-2: Void

### 5.5A.2 Configurations for intra-band non-contiguous CA

Table 5.5A.2-1: NR CA configurations and bandwidth combination sets defined for intra-band non-contiguous CA

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| NR CA Configuration | Uplink CA Configurations or single uplink carrier | Channel bandwidths for carrier  (MHz) | Channel bandwidths for carrier  (MHz) | Channel bandwidths for carrier  (MHz) | Maximum  Aggregated bandwidth  (MHz) | Bandwidth combination set |
| CA\_n2(2A) | - | 5, 10, 15, 20 | 5, 10, 15, 20 |  | 40 | 0 |
| CA\_n48(2A) |  | 10, 15, 20, 40, 50, 60 | 10, 15, 20, 40, 50, 60, 80, 90, 100 |  | 1402 | 0 |
|  | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100 | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100 |  | 1402 | 1 |
| CA\_n66(2A) | - | 5 (note), 10, 15, 20 | 5 (note), 10, 15, 20, 40 |  | 60 | 0 |
| 5, 10, 15, 20, 25, 30, 40 | 5, 10, 15, 20, 25, 30, 40 |  | 80 | 1 |
| 5, 10, 15, 20, 40 | 5, 10, 15, 20, 40 |  | 80 | 2 |
| CA\_n66(3A) | - | 5, 10, 15, 20, 40 | 5, 10, 15, 20, 40 | 5, 10, 15, 20, 40 | 80 | 0 |
| CA\_n71(2A) | - | 5,10, 15, 20 | 5,10,15, 20 |  | 30 | 0 |
| CA\_n77(2A) | n773  CA\_n77(2A) | 20, 40, 80, 100 | 20, 40, 80, 100 |  | 200 | 0 |
| 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  | 200 | 1 |
| See n77 channel bandwidths in Table 5.3.5-1 for each carrier | |  | 200 | 4 and 5 |
| CA\_n78(2A) |  | 10, 20, 40, 50, 60, 80, 90, 100 | 10, 20, 40, 50, 60, 80, 90, 100 |  | 200 | 0 |
| 10, 20, 25, 30, 40, 50, 60, 80, 90, 100 | 10, 20, 25, 30, 40, 50, 60, 80, 90, 100 |  | 200 | 1 |
| 10, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 10, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  | 200 | 2 |
| NOTE 1: 5 MHz is not applicable for 30/60 kHz SCS.  NOTE 2: Parameter value accounts for both, the maximum frequency range of band n48 (150 MHz), and the minimum frequency gaps in between NR non-contiguous component carriers.  NOTE 3: Minimum requirements for Power Class 2 are applicable for this uplink combination or single uplink carrier in this downlink/uplink combination | | | | | | |

### 5.5A.3 Configurations for inter-band CA

Table 5.5A.3-1: Void

Table 5.5A.3-2: Void

Table 5.5A.3-3: Void

#### 5.5A.3.1 Configurations for inter-band CA (two bands)

Table 5.5A.3.1-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (two bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration or single uplink carrier5 | NR Band | Channel bandwidth (MHz) (NOTE 3) | Bandwidth combination set |
| CA\_n1A-n3A | CA\_n1A-n3A | n1 | 5, 10, 15, 20 | 0 |
|  |  | n3 | 5, 10, 15, 20, 25, 30 |  |
|  |  | n1 | 5, 10, 15, 20, 25, 30, 40, 50 | 1 |
|  |  | n3 | 5, 10, 15, 20, 25, 30, 40 |  |
| CA\_n1(2A)-n3A | - | n1 | CA\_n1(2A)\_BCS0 | 0 |
|  |  | n3 | 5, 10, 15, 20, 25, 30, 40 |  |
| CA\_n1(2A)-n5A | - | n1 | CA\_n1(2A)\_BCS0 | 0 |
|  |  | n5 | 5, 10, 15, 20 |  |
| CA\_n1A-n8A | CA\_n1A-n8A | n1 | 5, 10, 15, 20 | 0 |
|  |  | n8 | 5, 10, 15, 20 |  |
|  |  | n1 | 5, 10, 15, 20, 25, 30, 40 | 1 |
|  |  | n8 | 5, 10, 15, 20 |  |
| CA\_n1(2A)-n8A | - | n1 | CA\_n1(2A)\_BCS0 | 0 |
|  |  | n8 | 5, 10, 15, 20 |  |
| CA\_n1A-n28A | - | n1 | 5, 10, 15, 20 | 0 |
|  |  | n28 | 5, 10, 15, 20 |  |
| CA\_n1A-n41A | CA\_n1A-n41A | n1 | 5, 10, 15, 20 | 0 |
|  |  | n41 | 10, 15, 20, 40, 50, 60, 80, 90, 100 |  |
|  |  | n1 | 5, 10, 15, 20, 25, 30, 40, 50 | 1 |
|  |  | n41 | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100 |  |
| CA\_n1A-n77A | - | n1 | 5, 10, 15, 20 | 0 |
|  |  | n77 | 10, 15, 20, 40, 50, 60, 80, 90, 100 |  |
| CA\_n1A-n78A | n784  CA\_n1A-n78A | n1 | 5, 10, 15, 20 | 0 |
|  |  | n78 | 10, 15, 20, 40, 50, 60, 80, 90, 100 |  |
|  |  | n1 | 5, 10, 15, 20, 25, 30, 40 | 1 |
|  |  | n78 | 10, 15, 20, 40, 50, 60, 80, 90, 100 |  |
|  |  | n1 | 5, 10, 15, 20, 25, 30, 40 | 2 |
|  |  | n78 | 10, 15, 20, 40, 50, 60, 80, 90, 100 |  |
|  |  | n1 | 5, 10, 15, 20 | 3 |
|  |  | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |
| CA\_n1A-n78(2A) | CA\_n1A-n78A | n1 | 5, 10, 15, 20 | 0 |
|  |  | n78 | CA\_n78(2A)\_BCS0 |  |
|  |  | n1 | 5, 10, 15, 20, 25, 30, 40, 50 | 1 |
|  |  | n78 | CA\_n78(2A)\_BCS1 |  |
|  |  | n1 | 5, 10, 15, 20 | 2 |
|  |  | n78 | CA\_n78(2A)\_BCS2 |  |
| CA\_n1A-n78C | CA\_n1A-n78A | n1 | 5, 10, 15, 20 | 0 |
|  |  | n78 | CA\_n78C\_BCS0 |  |
|  |  | n1 | 5, 10, 15, 20, 25, 30, 40, 50 | 1 |
|  |  | n78 | CA\_n78C\_BCS0 |  |
|  |  | n1 | 5, 10, 15, 20, 25, 30, 40 | 2 |
|  |  | n78 | CA\_n78C\_BCS0 |  |
| CA\_n1(2A)-n78A | - | n1 | CA\_n1(2A)\_BCS0 | 0 |
|  |  | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
| CA\_n1A-n79A | CA\_n1A-n79A | n1 | 5, 10, 15, 20 | 0 |
|  |  | n79 | 40, 50, 60, 80, 100 |  |
| CA\_n2A-n5A | CA\_n2A-n5A | n2 | 5, 10, 15, 20 | 0 |
|  |  | n5 | 5, 10, 15, 20 |  |
| CA\_n2A-n14A | CA\_n2A-n14A | n2 | 5, 10, 15, 20 | 0 |
| n14 | 5, 10 |
| CA\_n2A-n48A | CA\_n2A-n48A | n2 | 5, 10, 15, 20 | 0 |
|  |  | n48 | 5, 10, 15, 20, 40, 507, 607, 807, 907, 1007 |  |
| CA\_n2A-n48(2A) | CA\_n2A-n48A | n2 | 5, 10, 15, 20 | 0 |
|  |  | n48 | CA\_n48(2A)\_BCS0 |  |
|  |  | n2 | 5, 10, 15, 20 | 1 |
|  |  | n48 | CA\_n48(2A)\_BCS1 |  |
| CA\_n2A-n48B | CA\_n48B  CA\_n2A-n48A | n2 | 5, 10, 15, 20 | 0 |
| n48 | CA\_n48B\_BCS0 |  |
| n2 | 5, 10, 15, 20 | 1 |
| n48 | CA\_n48B\_BCS2 |  |
| CA\_n2A-n66A | - | n2 | 5, 10, 15, 20 | 0 |
|  |  | n66 | 5, 10, 15, 20, 40 |  |
|  | CA\_n2A-n66A | n2 | 5, 10, 15, 20 | 1 |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 |  |
| CA\_n2(2A)-n66A | - | n2 | CA\_n2(2A)\_BCS0 | 0 |
| n66 | 5, 10, 15, 20, 25, 30, 40 |
| CA\_n2A-n77A | n774  CA\_n2A-n77A4 | n2 | 5, 10, 15, 20 | 0 |
|  |  | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
| CA\_n2A-n77C | n774  CA\_n77C  CA\_n2A-n77A4 | n2 | 5, 10, 15, 20 | 0 |
| n77 | CA\_n77C\_BCS0 |  |
| n2 | n2 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
| n77 | CA\_n77C\_BCS 4 and 5 |  |
| CA\_n3A-n5A | CA\_n3A-n5A | n3 | 5, 10, 15, 20, 25, 30, 40, 50 | 0 |
|  |  | n5 | 5, 10, 15, 20 |  |
| CA\_n3(2A)-n5A | - | n3 | CA\_n3(2A)\_BCS0 | 0 |
|  |  | n5 | 5, 10, 15, |  |
| CA\_n3A-n8A | CA\_n3A-n8A | n3 | 5, 10, 15, 20, 25, 30 | 0 |
|  |  | n8 | 5, 10, 15, 20 |  |
|  |  | n3 | 5, 10, 15, 20, 25, 30, 40, 50 | 1 |
|  |  | n8 | 5, 10, 15, 20 |  |
| CA\_n3(2A)-n8A | - | n3 | CA\_n3(2A)\_BCS0 | 0 |
|  |  | n8 | 5, 10, 15, 20 |  |
| CA\_n3A-n28A | CA\_n3A-n28A | n3 | 5, 10, 15, 20, 25, 30 | 0 |
|  |  | n28 | 5, 10, 15, 20 |  |
| CA\_n3A-n41A | n414  CA\_n3A-n41A4 | n3 | 5, 10, 15, 20, 25, 30 | 0 |
|  |  | n41 | 10, 15, 20, 40, 50, 60, 80, 90, 100 |  |
| CA\_n3A-n77A | CA\_n3A-n77A | n3 | 5, 10, 15, 20, 25, 30 | 0 |
| n77 | 10, 15, 20, 40, 50, 60, 80, 90, 100 |
| CA\_n3A-n77(2A) | CA\_n77(2A)  CA\_n3A-n77A | n3 | 5, 10, 15, 20, 25, 30 | 0 |
|  |  | n77 | CA\_n77(2A)\_BCS0 |  |
| CA\_n3A-n78A | n784  CA\_n3A-n78A4 | n3 | 5, 10, 15, 20, 25, 30 | 0 |
|  |  | n78 | 10, 15, 20, 40, 50, 60, 80, 90, 100 |  |
|  |  | n3 | 5, 10, 15, 20, 25, 30, 40, | 1 |
|  |  | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
| CA\_n3A-n78(2A) | CA\_n3A-n78A  CA\_n78(2A) | n3 | 5, 10, 15, 20, 25, 30 | 0 |
|  |  | n78 | CA\_n78(2A)\_BCS0 |  |
|  | CA\_n3A-n78A | n3 | 5, 10, 15, 20, 25, 30, 40 | 1 |
|  |  | n78 | CA\_n78(2A)\_BCS2 |  |
| CA\_n3(2A)-n78A | - | n3 | CA\_n3(2A)\_BCS0 | 0 |
|  |  | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
| CA\_n3A-n79A | CA\_n3A-n79A | n3 | 5, 10, 15, 20, 25, 30 | 0 |
|  |  | n79 | 40, 50, 60, 80, 100 |  |
| CA\_n5A-n7A | - | n5 | 5, 10, 15, 20 | 0 |
|  |  | n7 | 5, 10, 15, 20, 25, 30, 40, 50 |  |
| CA\_n5A-n48A | CA\_n5A-n48A | n5 | 5, 10, 15, 20 | 0 |
|  |  | n48 | 5, 10, 15, 20, 40, 507, 607, 807, 907, 1007 |  |
| CA\_n5A-n48(2A) | | CA\_n5A-n48A | n5 | 5, 10, 15, 20 | 0 |
|  | |  | n48 | CA\_n48(2A)\_BCS0 |  |
|  | |  | n5 | 5, 10, 15, 20 | 1 |
|  | |  | n48 | CA\_n48(2A)\_BCS1 |  |
| CA\_n5A-n48B | CA\_n48B  CA\_n5A-n48A | n5 | 5, 10, 15, 20 | 0 |
| n48 | CA\_n48B\_BCS0 |  |
| n5 | 5, 10, 15, 20 | 1 |
| n48 | CA\_n48B\_BCS2 |  |
| CA\_n5A-n66A | CA\_n5A-n66A | n5 | 5, 10, 15, 20 | 0 |
|  |  | n66 | 5, 10, 15, 20, 40 |  |
|  |  | n5 | 5, 10, 15, 20 | 1 |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 |  |
| CA\_n5A-n77A | n774  CA\_n5A-n77A4 | n5 | 5, 10, 15, 20 | 0 |
|  |  | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
| CA\_n5A-n77C | n774  CA\_n5A-n77A4  CA\_n77C | n5 | 5, 10, 15, 20 | 0 |
| n77 | CA\_n77C\_BCS0 |  |
| n5 | 5, 10, 15, 20 | 1 |
| n77 | CA\_n77C\_BCS1 |  |
| CA\_n5A-n78A | CA\_n5A-n78A | n5 | 5, 10, 15, 20 | 0 |
|  |  | n78 | 10, 15, 20, 40, 50, 60, 80, 90, 100 |  |
|  |  | n5 | 5, 10, 15, 20 | 1 |
|  |  | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
| CA\_n5A-n78(2A) | CA\_n5A-n78A | n5 | 5, 10, 15, 20 | 0 |
|  |  | n78 | CA\_n78(2A)\_BCS2 |  |
| CA\_n7A-n78A | CA\_n7A-n78A | n7 | 5, 10, 15, 20 | 0 |
|  |  | n78 | 10, 15, 20, 40, 50, 60, 80, 90, 100 |  |
| CA\_n8A-n78A | CA\_n8A-n78A | n8 | 5, 10, 15, 20 | 0 |
|  |  | n78 | 10, 15, 20, 40, 50, 60, 80, 90, 100 |  |
|  |  | n8 | 5, 10, 15, 20 | 1 |
|  |  | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100 |  |
| CA\_n8A-n78(2A) | CA\_n8A-n78A | n8 | 5, 10, 15, 20 | 0 |
|  |  | n78 | CA\_n78(2A)\_BCS1 |  |
| CA\_n14A-n30A | CA\_n14A-n30A | n14 | 5, 10 | 0 |
| n30 | 5, 10 |
| CA\_n14A-n66A | CA\_n14A-n66A | n14 | 5, 10 | 0 |
| n66 | 5, 10, 15, 20, 25, 30, 40 |
| CA\_n14A-n77A | n774  CA\_n14A-n77A4 | n14 | 5, 10 | 0 |
| n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |
| CA\_n20A-n78A | CA\_n20A-n78A | n20 | 5, 10, 15, 20 | 0 |
| n78 | 10, 15, 20, 40, 50, 60, 80, 90, 100 |
| CA\_n24A-n41A | CA\_n24A-n41A | n24 | 5, 10 | 0 |
|  |  | n41 | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100 |  |
| CA\_n24A-n41(2A) | CA\_n24A-n41A | n24 | 5, 10 | 0 |
|  |  | n41 | CA\_n41(2A)\_BCS1 |  |
| CA\_n24A-n48A | CA\_n24A-n48A | n24 | 5, 10 | 0 |
|  |  | n48 | 5, 10, 15, 20, 40, 507, 607, 807, 907, 1007 |  |
| CA\_n24A-n48B | CA\_n24A-n48A | n24 | 5, 10 | 0 |
|  |  | n48 | CA\_n48B\_BCS1 |  |
| CA\_n24A-n48(2A) | CA\_n24A-n48A | n24 | 5, 10 | 0 |
|  |  | n48 | CA\_n48(2A)\_BCS0 |  |
| CA\_n24A-n77A | CA\_n24A-n77A | n24 | 5, 10 | 0 |
|  |  | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
| CA\_n24A-n77C | CA\_n24A-n77A | n24 | 5, 10 | 0 |
|  |  | n77 | CA\_n77C\_BCS1 |  |
| CA\_n25A-n46A | - | n25 | 5, 10, 15, 20 | 0 |
|  |  | n46 | 20, 40, 60, 80 |  |
| CA\_n25A-n66A | CA\_n25A-n66A | n25 | 5, 10, 15, 20, 25, 30, 40 | 0 |
|  |  | n66 | 5, 10, 15, 20, 30, 40 |  |
|  |  | n25 | 5, 10, 15, 20, 25, 30, 40 | 1 |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 |  |
|  |  | n25 | n25 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n66 | n66 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n25A-n77A | CA\_n25A-n77A4 | n25 | 5, 10, 15, 20 | 0 |
|  |  | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
|  |  | n25 | 5, 10, 15, 20, 25, 30, 40 | 1 |
|  |  | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
|  |  | n25 | n25 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n77 | n77 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n25A-n77(2A) | CA\_n25A-n77A4  CA\_n77(2A) | n25 | 5, 10, 15, 20, 25, 30, 40 | 0 |
|  |  | n77 | CA\_n77(2A)\_BCS1 |  |
|  |  | n25 | n25 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n77 | CA\_n77(2A)\_BCS 4 and 5 |  |
| CA\_n25A-n78A | CA\_n25A-n78A | n25 | 5, 10, 15, 20, 25, 30, 40 | 0 |
|  |  | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100 |  |
|  |  | n25 | 5, 10, 15, 20, 25, 30, 40 | 1 |
|  |  | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
| CA\_n25A-n78(2A) | CA\_n25A-n78A | n25 | 5, 10, 15, 20, 25, 30, 40 | 0 |
|  |  | n78 | CA\_n78(2A)\_BCS0 |  |
|  |  | n25 | 5, 10, 15, 20, 25, 30, 40 | 1 |
|  |  | n78 | CA\_n78(2A)\_BCS2 |  |
| CA\_n26A-n66A | CA\_n26A-n66A | n26 | 5, 10, 15, 20 | 0 |
| n66 | 5, 10, 15, 20, 25, 30, 40 |  |
| CA\_n26A-n66(2A) | CA\_n26A-n66A | n26 | 5, 10, 15, 20 | 0 |
| n66 | CA\_n66(2A)\_BCS0 |  |
| CA\_n26A-n70A | CA\_n26A-n70A | n26 | 5, 10, 15, 20 | 0 |
|  |  | n70 | 5, 10, 15, 201, 251 |  |
| CA\_n28A-n41A | n414  CA\_n28A-n41A4 | n28 | 5, 10, 15, 20 | 0 |
|  |  | n41 | 10, 15, 20, 40, 50, 60, 80, 90, 100 |  |
|  |  | n28 | 5, 10, 15, 20,30 | 1 |
|  |  | n41 | 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100 |  |
| CA\_n28A-n77A | CA\_n28A-n77A | n28 | 5, 10, 15, 20 | 0 |
| n77 | 10, 15, 20, 40, 50, 60, 80, 90, 100 |
| CA\_n28A-n77(2A) | CA\_n77(2A)  CA\_n28A-n77A | n28 | 5, 10, 15, 20 | 0 |
|  |  | n77 | CA\_n77(2A)\_BCS0 |  |
| CA\_n28A-n78A | CA\_n28A-n78A | n28 | 5, 10, 15, 20 | 0 |
|  |  | n78 | 10, 15, 20, 40, 50, 60, 80, 90, 100 |  |
| CA\_n28A-n78(2A) | CA\_n28A-n78A | n28 | 5, 10, 15, 20 | 0 |
|  |  | n78 | CA\_n78(2A)\_BCS0 |  |
| CA\_n28A-n79A | n794  CA\_n28A-n79A4 | n28 | 5, 10, 15, 20, 30 | 0 |
|  |  | n79 | 40, 50, 60, 80, 100 |  |
| CA\_n29A-n66A | - | n29 | 5, 10 | 0 |
|  |  | n66 | 5, 10, 15, 20, 40 |  |
| CA\_n29A-n66B | - | n29 | 5, 10 | 0 |
|  |  | n66 | CA\_n66B\_BCS0 |  |
| CA\_n29A-n66(2A) | - | n29 | 5, 10 | 0 |
|  |  | n66 | CA\_n66(2A)\_BCS0 |  |
| CA\_n29A-n70A | - | n29 | 5, 10 | 0 |
|  |  | n70 | 5, 10, 15, 201,, 251 |  |
| CA\_n29A-n71A | - | n29 | 5, 10 | 0 |
|  |  | n71 | 5, 10, 15, 20 |  |
| CA\_n39A-n41A | CA\_n39A-n41A | n39 | 5, 10, 15, 20, 25, 30, 40 | 0 |
|  |  | n41 | 10, 15, 20, 40, 50, 60, 80, 90, 100 |  |
| CA\_n41A-n66A | - | n41 | 10, 15, 20, 40, 50, 60, 80, 90, 100 | 0 |
|  |  | n66 | 5, 10, 15, 20, 40 |  |
| CA\_n41A-n71A | - | n41 | 10, 15, 20, 40, 50, 60, 80, 90, 100 | 0 |
|  |  | n71 | 5, 10, 15, 20 |  |
| CA\_n41A-n77A | | CA\_n41A-n77A | n41 | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100 | 0 |
|  | |  | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
|  | |  | n41 | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100 | 1 |
|  | |  | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
| CA\_n41A-n79A | n414, n794  CA\_n41A-n79A4 | n41 | 10, 15, 20, 40, 50, 60, 80, 90, 100 | 0 |
|  |  | n79 | 40, 50, 60, 80, 100 |  |
|  |  | n41 | 10, 15, 20, 40, 50, 60 | 1 |
|  |  | n79 | 40, 50, 60, 80, 100 |  |
|  |  | n41 | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100 | 2 |
|  |  | n79 | 40, 50, 60, 80, 100 |  |
| CA\_n41C-n79A | CA\_n41A-n79A  CA\_n41C | n41 | CA\_n41C\_BCS0 | 0 |
|  |  | n79 | 40, 50, 60, 80, 100 |  |
| CA\_n46A-n48A | CA\_n46A-n48A | n46 | 20, 40, 60, 80 | 0 |
|  |  | n48 | 20 |  |
| CA\_n46B-n48A | CA\_n46A-n48A | n46 | CA\_n46B\_BCS0 | 0 |
|  |  | n48 | 20 |  |
| CA\_n46C-n48A | CA\_n46A-n48A | n46 | CA\_n46C\_BCS0 | 0 |
|  |  | n48 | 20 |  |
| CA\_n46D-n48A | CA\_n46A-n48A | n46 | CA\_n46D\_BCS0 | 0 |
|  |  | n48 | 20 |  |
| CA\_n46A-n66A | - | n46 | 20, 40, 60, 80 | 0 |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 |  |
| CA\_n48A-n66A | CA\_n48A-n66A | n48 | 5, 10, 15, 20, 40, 507,607, 807,907,1007 | 0 |
|  |  | n66 | 5, 10, 15, 20, 40 |  |
|  |  | n48 | 5, 10, 15, 20, 40, 507,607, 807,907,1007 | 1 |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 |  |
|  |  | n48 | 5, 10, 15, 20, 30, 40, 507,607, 707, 807,907,1007 | 2 |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40, |  |
| CA\_n48A-n66(2A) | CA\_n48A-n66A | n48 | 5, 10, 15, 20, 30, 40, 507,607, 707, 807,907,1007 | 0 |
|  |  | n66 | CA\_n66(2A)\_BCS0 |  |
| CA\_n48B-n66A | CA\_n48A-n66A | n48 | CA\_n48B\_BCS0 | 0 |
|  |  | n66 | 5, 10, 15, 20, 40 |  |
|  |  | n48 | CA\_n48B\_BCS1 | 1 |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 |  |
|  |  | n48 | CA\_n48B\_BCS2 | 2 |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 |  |
| CA\_n48(2A)-n66A | CA\_n48A-n66A | n48 | CA\_n48(2A)\_BCS0 | 0 |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 |  |
|  |  | n48 | CA\_n48(2A)\_BCS0 | 1 |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 |  |
|  |  | n48 | CA\_n48(2A)\_BCS1 | 2 |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 |  |
| CA\_n48(2A)-n66(2A) | CA\_n48A-n66A | n48 | CA\_n48(2A)\_BCS1 | 0 |
|  |  | n66 | CA\_n66(2A)\_BCS0 |  |
| CA\_n48A-n70A6 | CA\_n48A-n70A | n48 | 5, 10, 15, 20, 30, 40, 507,607, 707, 807,907,1007 | 0 |
|  |  | n70 | 5, 10, 15, 201, 251 |  |
| CA\_n48(2A)-n70A | CA\_n48A-n70A | n48 | CA\_n48(2A)\_BCS1 | 0 |
|  |  | n70 | 5, 10, 15, 201, 251 |  |
| CA\_n48B-n70A | CA\_n48A-n70A | n48 | CA\_n48B\_BCS2 | 0 |
|  |  | n70 | 5, 10, 15, 201, 251 |  |
| CA\_n48A-n71A | CA\_n48A-n71A | n48 | 5, 10, 15, 20, 30, 40, 507,607, 707, 807,907,1007 | 0 |
|  |  | n71 | 5, 10, 15, 20 |  |
| CA\_n48A-n71(2A) | CA\_n48A-n71A | n48 | 5, 10, 15, 20, 30, 40, 507,607, 707, 807,907,1007 | 0 |
|  |  | n71 | CA\_n71(2A)\_BCS0 |  |
| CA\_n48(2A)-n71A | CA\_n48A-n71A | n48 | CA\_n48(2A)\_BCS1 | 0 |
|  |  | n71 | 5, 10, 15, 20 |  |
| CA\_n48(2A)-n71(2A) | CA\_n48A-n71A | n48 | CA\_n48(2A)\_BCS1 | 0 |
|  |  | n71 | CA\_n71(2A)\_BCS0 |  |
| CA\_n48B-n71A | CA\_n48A-n71A | n48 | CA\_n48B\_BCS2 | 0 |
|  |  | n71 | 5, 10, 15, 20 |  |
| CA\_n48A-n77A | n774 | n48 | 5, 10, 15, 20, 30, 40, 507,607, 707, 807,907,1007 | 0 |
|  |  | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
| CA\_n48A-n77C | | CA\_n77C | n48 | 5, 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100 | 0 |
|  | |  | n77 | CA\_n77C\_BCS0 |  |
|  | |  | n48 | 5, 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100 | 1 |
|  | |  | n77 | CA\_n77C\_BCS1 |  |
| CA\_n48(2A)-n77A | | - | n48 | CA\_n48(2A)\_BCS0 | 0 |
|  | |  | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
|  | |  | n48 | CA\_n48(2A)\_BCS1 | 1 |
|  | |  | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
|  | |  | n48 | CA\_n48(2A)\_BCS4 and 5 | 4 and 5 |
|  | |  | n77 | See n77 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n48B-n77A | | CA\_n48B | n48 | CA\_n48B\_BCS0 | 0 |
|  | |  | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
|  | |  | n48 | CA\_n48B\_BCS1 | 1 |
|  | |  | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
|  | |  | n48 | CA\_n48B\_BCS2 | 2 |
|  | |  | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
| CA\_n66A-n70A | - | n66 | 5, 10, 15, 20, 40 | 0 |
|  |  | n70 | 5, 10, 15, 201, 251 |  |
| CA\_n66B-n70A | - | n66 | CA\_n66B\_BCS0 | 0 |
|  |  | n70 | 5, 10, 15, 201, 251 |  |
| CA\_n66(2A)-n70A | - | n66 | CA\_n66(2A)\_BCS0 | 0 |
|  |  | n70 | 5, 10, 15, 201, 251 |  |
| CA\_n66A-n71A | CA\_n66A-n71A | n66 | 5, 10, 15, 20, 40 | 0 |
|  |  | n71 | 5, 10, 15, 20 |  |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 | 1 |
|  |  | n71 | 5, 10, 15, 20 |  |
|  |  | n66 | n66 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n71 | n71 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n66A-n71(2A) | - | n66 | 5, 10, 15, 20, 40 | 0 |
|  |  | n71 | CA\_n71(2A)\_BCS0 |  |
|  | CA\_n66A-n71A | n66 | 5, 10, 15, 20, 25, 30, 40 | 1 |
|  |  | n71 | CA\_n71(2A)\_BCS0 |  |
| CA\_n66(2A)-n71A | CA\_n66A-n71A | n66 | CA\_n66(2A)\_BCS0 | 0 |
|  |  | n71 | 5, 10, 15, 20 |  |
| CA\_n66(2A)-n71(2A) | CA\_n66A-n71A | n66 | CA\_n66(2A)\_BCS1 | 0 |
|  |  | n71 | CA\_n71(2A)\_BCS0 |  |
| CA\_n66B-n71A | CA\_n66A-n71A | n66 | CA\_n66B\_BCS0 | 0 |
|  |  | n71 | 5, 10, 15, 20 |  |
| CA\_n66A-n77A | n774  CA\_n66A-n77A4 | n66 | 5, 10, 15, 20, 40 | 0 |
|  |  | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 | 1 |
|  |  | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
|  |  | n66 | n66 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n77 | n77 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n66A-n77(2A) | CA\_n66A-n77A4  CA\_n77(2A) | n66 | 5, 10, 15, 20, 40 | 0 |
|  |  | n77 | CA\_n77(2A)\_BCS0 |  |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 | 1 |
|  |  | n77 | CA\_n77(2A)\_BCS1 |  |
|  |  | n66 | n66 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n77 | CA\_n77(2A)\_BCS 4 and 5 |  |
| CA\_n66A-n78A | CA\_n66A-n78A | n66 | 5, 10, 15, 20, 40 | 0 |
|  |  | n78 | 10, 15, 20, 40, 50, 60, 80, 90, 100 |  |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 | 1 |
|  |  | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
| CA\_n66A-n78(2A) | CA\_n66A-n78A | n66 | 5, 10, 15, 20, 30, 40 | 0 |
|  |  | n78 | CA\_n78(2A)\_BCS1 |  |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 | 1 |
|  |  | n78 | CA\_n78(2A)\_BCS2 |  |
| CA\_n66A-n77C | n77  CA\_n77C  CA\_n66A-n77A | n66 | 5, 10, 15, 20, 25, 30, 40 | 0 |
|  |  | n77 | CA\_n77C\_BCS1 |  |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 | 1 |
|  |  | n77 | CA\_n77C\_BCS1 |  |
| CA\_n70A-n71A | CA\_n70A-n71A | n70 | 5, 10, 15, 201, 251 | 0 |
|  |  | n71 | 5, 10, 15, 20 |  |
| CA\_n70A-n71(2A) | CA\_n70A-n71A | n70 | 5, 10, 15, 201 | 0 |
|  |  | n71 | CA\_n71(2A)\_BCS0 |  |
| CA\_n71A-n77A | n774  CA\_n71A-n77A4 | n71 | 5, 10, 15, 20 | 0 |
|  |  | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
|  |  | n71 | n71 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n77 | n77 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n71A-n77(2A) | | CA\_n71A-n77A | n71 | 5, 10, 15, 20 | 0 |
|  | |  | n77 | CA\_n77(2A)\_BCS1 |  |
|  | |  | n71 | n71 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  | |  | n77 | CA\_n77(2A)\_BCS 4 and 5 |  |
| CA\_n71A-n78A | | CA\_n71A-n78A | n71 | 5, 10, 15, 20 | 0 |
|  | |  | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
|  | |  | n71 | See n71 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  | |  | n78 | See n78 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n71A-n78(2A) | | CA\_n71A-n78A | n71 | 10, 15, 20 | 0 |
|  | |  | n78 | CA\_n78(2A)\_BCS2 |  |
|  | |  | n71 | See n71 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  | |  | n78 | CA\_n78(2A)\_BCS4 and 5 |  |
| CA\_n77A-n79A | - | n77 | 10, 15, 20, 40, 50, 60, 80, 90, 100 | 0 |
|  |  | n79 | 40, 50, 60, 80, 100 |  |
| CA\_n78A-n79A | - | n78 | 10, 15, 20, 40, 50, 60, 80, 90, 100 | 0 |
|  |  | n79 | 40, 50, 60, 80, 100 |  |
| NOTE 1: This UE channel bandwidth is applicable only to downlink.  NOTE 2: The minimum requirements for intra-band contiguous or non-contiguous CA apply.  NOTE 3: The SCS of each channel bandwidth for NR band refers to Table 5.3.5-1.  NOTE 4: Minimum requirements for Power Class 2 are applicable for this uplink combination with 1Tx antenna connector in each band or single uplink carrier with up to 2Tx antenna connectors in this downlink/uplink combination.  NOTE 5: Only single uplink carriers with power class other than PC3 are listed.  NOTE 6: The same configuration applies to corresponding NR-DC configuration in Table 5.5B.1-1. If UE supporting NR-DC configuration do not support the corresponding CA configuration, NR-DC configuration is used in CA test cases.  NOTE 7: For this bandwidth, the minimum requirements are restricted to operation when carrier is configured as a downlink SCell part of CA configuration. | | | | |

#### 5.5A.3.2 Configurations for inter-band CA (three bands)

Table 5.5A.3.2-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration  or single uplink carrier6 | NR Band | Channel bandwidth (MHz) (NOTE 3) | Bandwidth combination set |
| CA\_n1A-n3A-n28A | - | n1 | 5, 10, 15, 20 | 0 |
|  |  | n3 | 5, 10, 15, 20, 25, 30 |  |
|  |  | n28 | 5, 10, 15, 202 |  |
| CA\_n1A-n3A-n77A | CA\_n1A-n3A  CA\_n1A-n77A  CA\_n3A-n77A | n1 | 5, 10, 15, 20 | 0 |
|  |  | n3 | 5, 10, 15, 20, 25, 30 |  |
|  |  | n77 | 10, 15, 20, 40, 50, 60, 80, 90, 100 |  |
|  |  | n1 | 5, 10, 15, 20, 25, 30, 40, 50 | 1 |
|  |  | n3 | 5, 10, 15, 20, 25, 30, 40 |  |
|  |  | n77 | 10, 15, 20, 40, 50, 60, 80, 90, 100 |  |
|  |  | n1 | 5, 10, 15, 20 | 2 |
|  |  | n3 | 5, 10, 15, 20, 25, 30, 35, 40 |  |
|  |  | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
| CA\_n1A-n3A-n78A | CA\_n1A-n3A  CA\_n1A-n78A  CA\_n3A-n78A | n1 | 5, 10, 15, 20 | 0 |
|  |  | n3 | 5, 10, 15, 20, 25, 30 |  |
|  |  | n78 | 10, 15, 20, 40, 50, 60, 80, 90, 100 |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| CA\_n1A-n8A-n78A | CA\_n1A-n8A  CA\_n1A-n78A  CA\_n8A-n78A | n1 | 5, 10, 15, 20 | 0 |
|  |  | n8 | 5, 10, 15, 20 |  |
|  |  | n78 | 10, 15, 20, 40, 50, 60, 80, 90, 100 |  |
|  | - | n1 | 5, 10, 15, 20 | 1 |
|  |  | n8 | 5, 10, 15, 20 |  |
|  |  | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100 |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| CA\_n1A-n28A-n77A | CA\_n1A-n28A  CA\_n1A-n77A  CA\_n28A-n77A | n1 | 5, 10, 15, 20 | 0 |
|  |  | n28 | 5, 10, 15, 20 |  |
|  |  | n77 | 10, 15, 20, 40, 50, 60, 80, 90, 100 |  |
|  |  | n1 | 5, 10, 15, 20 | 1 |
|  |  | n28 | 5, 10, 15, 20, 25, 30 |  |
|  |  | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
| CA\_n1A-n28A-n78A | CA\_n1A-n28A  CA\_n1A-n78A  CA\_n28A-n78A | n1 | 5, 10, 15, 20 | 0 |
|  |  | n28 | 5, 10, 15, 202 |  |
|  |  | n78 | 10, 15, 20, 40, 50, 60, 80, 90, 100 |  |
| CA\_n1A-n41A-n77A | CA\_n1A-n41A  CA\_n1A-n77A  CA\_n41A-n77A | n1 | 5, 10, 15, 20 | 0 |
|  |  | n41 | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100 |  |
|  |  | n77 | 10, 15, 20, 40, 50, 60, 80, 90, 100 |  |
| CA\_n1A-n78A-n79A4 | CA\_n1A-n78A  CA\_n1A-n79A  CA\_n78A-n79A | n1 | 5, 10, 15, 20 | 0 |
|  |  | n78 | 10, 15, 20, 40, 50, 60, 80, 90 |  |
|  |  | n79 | 40, 50, 60, 80 |  |
| CA\_n2A-n5A-n48A | CA\_n2A-n5A  CA\_n2A-n48A  CA\_n5A-n48A | n2 | 5, 10, 15, 20 | 0 |
| n5 | 5, 10, 15, 20 |
| n48 | 5, 10, 15, 20, 30, 40, 5010, 6010, 7010, 8010, 9010, 10010 |
| CA\_n2A-n5A-n77A | n777, 9  CA\_n2A-n5A  CA\_n2A-n77A7  CA\_n5A-n77A7 | n2 | 5, 10, 15, 20 | 0 |
|  |  | n5 | 5, 10, 15, 20 |  |
|  |  | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
| CA\_n2A-n5A-n77C | CA\_n2A-n5A  CA\_n2A-n77A  CA\_n5A-n77A  CA\_n77C | n2 | 5, 10, 15, 20, 25, 30, 40 | 0 |
|  |  | n5 | 5, 10, 15, 20, 251 |  |
|  |  | n77 | CA\_n77C\_BCS0 |  |
|  |  | n2 | 5, 10, 15, 20, 25, 30, 40 | 1 |
|  |  | n5 | 5, 10, 15, 20, 251 |  |
|  |  | n77 | CA\_n77C\_BCS1 |  |
| CA\_n2A-n48A-n66A | CA\_n2A-n48A  CA\_n2A-n66A  CA\_n48A-n66A | n2 | 5, 10, 15, 20 | 0 |
| n48 | 5, 10, 15, 20, 30, 40, 5010, 6010, 7010, 8010, 9010, 10010 |
| n66 | 5, 10, 15, 20, 25, 30, 40 |
| CA\_n2A-n48A-n77A | n77  CA\_n2A-n48A  CA\_n2A-n77A | n2 | 5, 10, 15, 20 | 0 |
| n48 | 5, 10, 15, 20, 30, 40, 5010, 6010, 7010, 8010, 9010, 10010 |
| n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |
| CA\_n2A-n48A-n77C | CA\_n2A-n48A  CA\_n2A-n77A  CA\_n77C | n2 | 5, 10, 15, 20, 25, 30, 40 | 0 |
|  |  | n48 | 5, 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100 |  |
|  |  | n77 | CA\_n77C\_BCS0 |  |
|  |  | n2 | 5, 10, 15, 20, 25, 30, 40 | 1 |
|  |  | n48 | 5, 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100 |  |
|  |  | n77 | CA\_n77C\_BCS1 |  |
| CA\_n2A-n66A-n77A | n777, 9  CA\_n2A-n66A  CA\_n66A-n77A7  CA\_n2A-n77A7 | n2 | 5, 10, 15, 20 | 0 |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 |  |
|  |  | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
| CA\_n2A-n66A-n77C | CA\_n2A-n66A  CA\_n2A-n77A  CA\_n66A-n77A | n2 | 5, 10, 15, 20, 25, 30, 40 | 0 |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 |  |
|  |  | n77 | CA\_n77C\_BCS0 |  |
|  |  | n2 | 5, 10, 15, 20, 25, 30, 40 | 1 |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 |  |
|  |  | n77 | CA\_n77C\_BCS1 |  |
| CA\_n3A-n28A-n41A | CA\_n3A-n28A  CA\_n3A-n41A  CA\_n28A-n41A | n3 | 5, 10, 15, 20, 25, 30, 40 | 0 |
|  |  | n28 | 5, 10, 15, 20, 30 |  |
|  |  | n41 | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100 |  |
| CA\_n3A-n28A-n77A | CA\_n3A-n28A  CA\_n3A-n77A  CA\_n28A-n77A | n3 | 5, 10, 15, 20, 25, 30 | 0 |
|  |  | n28 | 5, 10 |  |
|  |  | n77 | CA\_n41B\_BCS0 |  |
| CA\_n3A-n28A-n78A | - | n3 | 5, 10, 15, 20 | 0 |
|  |  | n28 | 5, 10, 15, 202 |  |
|  |  | n78 | 10, 15, 20, 40, 50, 60, 80, 90, 100 |  |
| CA\_n3A-n41A-n77A | CA\_n3A-n41A  CA\_n3A-n77A  CA\_n41A-n77A | n3 | 5, 10, 15, 20, 25, 30, 40 | 0 |
|  |  | n41 | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100 |  |
|  |  | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
| CA\_n5A-n48A-n66A | CA\_n5A-n48A  CA\_n5A-n66A  CA\_n48A-n66A | n5 | 5, 10, 15, 20 | 0 |
| n48 | 5, 10, 15, 20, 30, 40, 5010, 6010, 7010, 8010, 9010, 10010 |
| n66 | 5, 10, 15, 20, 25, 30, 40 |
| CA\_n5A-n48A-n77A | n77  CA\_n5A-n48A  CA\_n5A-n77A | n5 | 5, 10, 15, 20 | 0 |
| n48 | 5, 10, 15, 20, 30, 40, 5010, 6010, 7010, 8010, 9010, 10010 |
| n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |
| CA\_n5A-n48A-n77C | CA\_n5A-n48A  CA\_n5A-n77A  CA\_n77C | n5 | 5, 10, 15, 20, 251 | 0 |
|  |  | n48 | 5, 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100 |  |
|  |  | n77 | CA\_n77C\_BCS0 |  |
|  |  | n5 | 5, 10, 15, 20, 251 | 1 |
|  |  | n48 | 5, 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100 |  |
|  |  | n77 | CA\_n77C\_BCS1 |  |
| CA\_n5A-n66A-n77A | n777, 9  CA\_n5A-n66A  CA\_n66A-n77A7  CA\_n5A-n77A7 | n5 | 5, 10, 15, 20 | 0 |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 |  |
|  |  | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
| CA\_n5A-n66A-n77C | CA\_n5A-n66A  CA\_n5A-n77A  CA\_n66A-n77A  CA\_n77C | n5 | 5, 10, 15, 20, 251 | 0 |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 |  |
|  |  | n77 | CA\_n77C\_BCS0 |  |
|  |  | n5 | 5, 10, 15, 20, 251 | 1 |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 |  |
|  |  | n77 | CA\_n77C\_BCS1 |  |
| CA\_n25A-n66A-n77A | CA\_n25A-n66A  CA\_n25A-n77A  CA\_n66A-n77A | n25 | 5, 10, 15, 20, 25, 30, 40 | 0 |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 |  |
|  |  | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
|  | CA\_n25A-n66A  CA\_n25A-n77A  CA\_n66A-n77A | n25 | n25 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n66 | n66 channel bandwidths in Table 5.3.5-1 |  |
|  |  | n77 | n77 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n25A-n66A-n77(2A) | CA\_n25A-n66A  CA\_n25A-n77A  CA\_n66A-n77A | n25 | 5, 10, 15, 20, 25, 30, 40 | 0 |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 |  |
|  |  | n77 | CA\_n77(2A)\_BCS1 |  |
|  | CA\_n25A-n66A  CA\_n25A-n77A  CA\_n66A-n77A | n25 | n25 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n66 | n66 channel bandwidths in Table 5.3.5-1 |  |
|  |  | n77 | CA\_n77(2A)\_BCS 4 and 5 |  |
| CA\_n25A-n66A-n78A | CA\_n25A-n66A  CA\_n25A-n78A  CA\_n66A-n78A | n25 | 5, 10, 15, 20, 25, 30, 40 | 0 |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 |  |
|  |  | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100 |  |
|  |  | n25 | 5, 10, 15, 20, 25, 30, 40 | 1 |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 |  |
|  |  | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
| CA\_n25A-n66A-n78(2A) | CA\_n25A-n66A CA\_n25A-n78A CA\_n66A-n78A | n25 | 5, 10, 15, 20, 25, 30, 40 | 0 |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 |  |
|  |  | n78 | CA\_n78(2A)\_BCS2 |  |
| CA\_n26A-n66A-n70A | CA\_n26A-n66A  CA\_n26A-n70A | n26 | 5, 10, 15, 20 | 0 |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 |  |
|  |  | n70 | 5, 10, 15, 201, 251 |  |
| CA\_n26A-n66(2A)-n70A | CA\_n26A-n66A  CA\_n26A-n70A | n26 | 5, 10, 15, 20 | 0 |
|  |  | n66 | CA\_n66(2A)\_BCS0 |  |
|  |  | n70 | 5, 10, 15, 201, 251 |  |
| CA\_n28A-n41A-n79A | CA\_n28A-n41A  CA\_n28A-n79A  CA\_n41A-n79A | n28 | 5, 10, 15, 20, 30 | 0 |
| n41 | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100 |
| n79 | 40, 50, 60, 80, 100 |
| CA\_n29A-n66A-n70A | - | n29 | 5, 10 | 0 |
|  |  | n66 | 5, 10, 15, 20, 40 |  |
|  |  | n70 | 5, 10, 15, 201, 251 |  |
| CA\_n29A-n66B-n70A | - | n29 | 5, 10 | 0 |
|  |  | n66 | CA\_n66B\_BCS0. |  |
|  |  | n70 | 5, 10, 15, 201, 251 |  |
| CA\_n29A-n66(2A)-n70A | - | n29 | 5, 10 | 0 |
|  |  | n66 | CA\_n66(2A)\_BCS0 |  |
|  |  | n70 | 5, 10, 15, 201, 251 |  |
| CA\_n41A-n66A-n71A |  | n41 | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100 | 0 |
|  |  | n66 | 5, 10, 15, 20, 40 |  |
|  |  | n71 | 5, 10, 15, 20 |  |
| CA\_n48A-n66A-n70A | CA\_n48A-n66A  CA\_n48A-n70A | n48 | 5, 10, 15, 20, 30, 40, 5010, 6010, 8010, 9010, 10010 | 0 |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 |  |
|  |  | n70 | 5, 10, 15, 201, 251 |  |
| CA\_n48A-n66(2A)-n70A | CA\_n48A-n66A  CA\_n48A-n70A | n48 | 5, 10, 15, 20, 30, 40, 5010, 6010, 8010, 9010, 10010 | 0 |
|  |  | n66 | CA\_n66(2A)\_BCS0 |  |
|  |  | n70 | 5, 10, 15, 201, 251 |  |
| CA\_n48(2A)-n66A-n70A | CA\_n48A-n66A  CA\_n48A-n70A | n48 | CA\_n48(2A)\_BCS1 | 0 |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 |  |
|  |  | n70 | 5, 10, 15, 201, 251 |  |
| CA\_n48B-n66A-n70A | CA\_n48A-n66A  CA\_n48A-n70A | n48 | CA\_n48B\_BCS2 | 0 |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 |  |
|  |  | n70 | 5, 10, 15, 201, 251 |  |
| CA\_n48A-n66A-n71A | CA\_n48A-n71A  CA\_n66A-n71A  CA\_n48A-n66A | n48 | 5, 10, 15, 20, 30, 40, 5010, 6010, 8010, 9010, 10010 | 0 |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 |  |
|  |  | n71 | 5, 10, 15, 20 |  |
| CA\_n48A-n66(2A)-n71A | CA\_n48A-n71A  CA\_n66A-n71A  CA\_n48A-n66A | n48 | 5, 10, 15, 20, 30, 40, 5010, 6010, 8010, 9010, 10010 | 0 |
|  |  | n66 | CA\_n66(2A)\_BCS0 |  |
|  |  | n71 | 5, 10, 15, 20 |  |
| CA\_n48(2A)-n66A-n71A | CA\_n48A-n71A  CA\_n66A-n71A  CA\_n48A-n66A | n48 | CA\_n48(2A)\_BCS1 | 0 |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 |  |
|  |  | n71 | 5, 10, 15, 20 |  |
| CA\_n48B-n66A-n71A | CA\_n48A-n71A  CA\_n66A-n71A  CA\_n48A-n66A | n48 | CA\_n48B\_BCS2 | 0 |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 |  |
|  |  | n71 | 5, 10, 15, 20 |  |
| CA\_n48A-n66A-n71(2A) | CA\_n48A-n71A  CA\_n66A-n71A  CA\_n48A-n66A | n48 | 5, 10, 15, 20, 30, 40, 5010, 6010, 8010, 9010, 10010 | 0 |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 |  |
|  |  | n71 | CA\_n71(2A)\_BCS0 |  |
| CA\_n48A-n66A-n77A | n77  CA\_n48A-n66A  CA\_n66A-n77A | n48 | 5, 10, 15, 20, 30, 40, 5010, 6010, 7010, 8010, 9010, 10010 | 0 |
| n66 | 5, 10, 15, 20, 25, 30, 40 |
| n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |
| CA\_n48A-n66A-n77C | CA\_n48A-n66A  CA\_n66A-n77A  CA\_n77C | n48 | 5, 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100 | 0 |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 |  |
|  |  | n77 | CA\_n77C\_BCS0 |  |
|  |  | n48 | 5, 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100 | 1 |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 |  |
|  |  | n77 | CA\_n77C\_BCS1 |  |
| CA\_n48A-n70A-n71A | CA\_n48A-n71A  CA\_n70A-n71A  CA\_n48A-n70A | n48 | 5, 10, 15, 20, 30, 40, 5010, 6010, 8010, 9010, 10010 | 0 |
|  |  | n70 | 5, 10, 15, 201, 251 |  |
|  |  | n71 | 5, 10, 15, 20 |  |
| CA\_n48(2A)-n70A-n71A | CA\_n48A-n71A  CA\_n70A-n71A  CA\_n48A-n70A | n48 | CA\_n48(2A)\_BCS1 | 0 |
|  |  | n70 | 5, 10, 15, 201, 251 |  |
|  |  | n71 | 5, 10, 15, 20 |  |
| CA\_n48A-n70A-n71(2A) | CA\_n48A-n71A  CA\_n70A-n71A  CA\_n48A-n70A | n48 | 5, 10, 15, 20, 30, 40, 5010, 6010, 8010, 9010, 10010 | 0 |
|  |  | n70 | 5, 10, 15, 201, 251 |  |
|  |  | n71 | CA\_n71(2A)\_BCS0 |  |
| CA\_n66A-n70A-n71A | CA\_n66A-n71A  CA\_n70A-n71A | n66 | 5, 10, 15, 20, 40 | 0 |
|  |  | n70 | 5, 10, 15, 201, 251 |  |
|  |  | n71 | 5, 10, 15, 20 |  |
| CA\_n66A-n70A-n71(2A) | CA\_n66A-n71A  CA\_n70A-n71A | n66 | 5, 10, 15, 20, 25, 30, 40 | 0 |
|  |  | n70 | 5, 10, 15, 201, 251 |  |
|  |  | n71 | CA\_n71(2A)\_BCS0 |  |
| CA\_n66A-n71A-n77A | CA\_n66A-n71A  CA\_n66A-n77A  CA\_n71A-n77A | n66 | 5, 10, 15, 20, 25, 30, 40 | 0 |
|  |  | n71 | 5, 10, 15, 20 |  |
|  |  | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
|  |  | n66 | n66 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n71 | n71 channel bandwidths in Table 5.3.5-1 |  |
|  |  | n77 | n77 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n66A-n71A-n77(2A) | CA\_n66A-n71A  CA\_n66A-n77A  CA\_n71A-n77A | n66 | 5, 10, 15, 20, 25, 30, 40 | 0 |
|  |  | n71 | 5, 10, 15, 20 |  |
|  |  | n77 | CA\_n77(2A)\_BCS1 |  |
|  |  | n66 | n66 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n71 | n71 channel bandwidths in Table 5.3.5-1 |  |
|  |  | n77 | CA\_n77(2A) BCS 4 and 5 |  |
| CA\_n66A-n71A-n78A | CA\_n66A-n71A  CA\_n66A-n78A  CA\_n71A-n78A | n66 | 5, 10, 15, 20, 25, 30, 40 | 0 |
|  |  | n71 | 5, 10, 15, 20 |  |
|  |  | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
| CA\_n66A-n71A-n78(2A) | CA\_n66A-n71A  CA\_n66A-n78A  CA\_n71A-n78A | n66 | 5, 10, 15, 20, 25, 30, 40 | 0 |
|  |  | n71 | 5, 10, 15, 20 |  |
|  |  | n78 | CA\_n78(2A)\_BCS2 |  |
| CA\_n66B-n70A-n71A | CA\_n66A-n71A  CA\_n70A-n71A | n66 | CA\_n66B\_BCS0 | 0 |
|  |  | n70 | 5, 10, 15, 201, 251 |  |
|  |  | n71 | 5, 10, 15, 20 |  |
| CA\_n66(2A)-n70A-n71A | CA\_n66A-n71A  CA\_n70A-n71A | n66 | CA\_n66(2A)\_BCS0 | 0 |
|  |  | n70 | 5, 10, 15, 201, 251 |  |
|  |  | n71 | 5, 10, 15, 20 |  |
| NOTE 1: This UE channel bandwidth is applicable only to downlink  NOTE 2: For the 20 MHz bandwidth, the minimum requirements are specified for NR UL carrier frequencies confined to either 713-723 MHz or 728-738 MHz.  NOTE 3: The SCS of each channel bandwidth for NR band refers to Table 5.3.5-1.  NOTE 4: Simultaneous Rx/Tx capability for TDD combinations does not apply for UEs supporting band n78 with an n77 implementation.  NOTE 5: FFS  NOTE 6: FFS  NOTE 7: Power Class 2 is allowed for this uplink combination or single uplink carrier in this downlink/uplink combination  NOTE 8: FFS  NOTE 9: Power Class 1.5 is allowed for single uplink carrier in this downlink/uplink combination.  NOTE 10: For this bandwidth, the minimum requirements are restricted to operation when carrier is configured as a downlink SCell part of CA configuration. | | | | |

#### 5.5A.3.3 Configurations for inter-band CA (four bands)

Table 5.5A.3.3-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (four bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration  or single uplink carrier4 | NR Band | Channel bandwidth (MHz) (NOTE 3) | Bandwidth combination set |
| CA\_n1A-n3A-n28A-n78A | - | n1 | 5, 10, 15, 20 | 0 |
|  |  | n3 | 5, 10, 15, 20, 25, 30 |  |
|  |  | n28 | 5, 10, 15, 202 |  |
|  |  | n78 | 10, 15, 20, 40, 50, 60, 80, 901, 100 |  |
| CA\_n2A-n5A-n48A-n66A | - | n2 | 5, 10, 15, 20 | 0 |
|  |  | n5 | 5, 10, 15, 20 |  |
|  |  | n48 | 5, 10, 15, 20, 30, 40, 506, 606, 706, 806, 906, 1006 |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | n66 | 10, 15, 20, 25, 30, 40 |  |
|  | CA\_n2A-n5A  CA\_n2A-n48A  CA\_n2A-n66A  CA\_n5A-n48A  CA\_n5A-n66A  CA\_n48A-n66A | n2 | 5, 10, 15, 20, 25, 30, 40 | 1 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | n5 | 5, 10, 15, 20, 25 |  |
|  |  | n48 | 5, 10, 15, 20, 30, 40, 506, 606, 706, 806, 906, 1006 |  |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 |  |
| CA\_n2A-n5A-n48A-n77A | - | n2 | 5, 10, 15, 20 | 0 |
|  |  | n5 | 5, 10, 15, 20 |  |
|  |  | n48 | 5, 10, 15, 20, 30, 40, 506, 606, 706, 806, 906, 1006 |  |
|  |  | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
|  | CA\_n2A-n5A  CA\_n2A-n48A  CA\_n2A-n77A  CA\_n5A-n48A  CA\_n5A-n77A | n2 | 5, 10, 15, 20, 25, 30, 40 | 1 |
|  |  | n5 | 5, 10, 15, 20, 25 |  |
|  |  | n48 | 5, 10, 15, 20, 30, 40, 506, 606, 706, 806, 906, 1006 |  |
|  |  | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
| CA\_n2A-n5A-n66A-n77A | CA\_n2A-n5A  CA\_n2A-n66A  CA\_n2A-n77A5  CA\_n5A-n66A  CA\_n5A-n77A5  CA\_n66A-n77A5 | n2 | 5, 10, 15, 20 | 0 |
|  |  | n5 | 5, 10, 15, 20 |  |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 |  |
|  |  | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
| CA\_n2A-n48A-n66A-n77A | - | n2 | 5, 10, 15, 20 | 0 |
|  |  | n48 | 5, 10, 15, 20, 30, 40, 506, 606, 706, 806, 906, 1006 |  |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 |  |
|  |  | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
|  | CA\_n2A-n48A  CA\_n2A-n66A  CA\_n2A-n77A  CA\_n48A-n66A  CA\_n66A-n77A | n2 | 5, 10, 15, 20, 25, 30, 40 | 1 |
|  |  | n48 | 5, 10, 15, 20, 30, 40, 506, 606, 706, 806, 906, 1006 |  |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 |  |
|  |  | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
| CA\_n5A-n48A-n66A-n77A | - | n5 | 5, 10, 15, 20, 25 | 0 |
|  |  | n48 | 5, 10, 15, 20, 30, 40, 506, 606, 706, 806, 906, 1006 |  |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 |  |
|  |  | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
|  | CA\_n5A-n48A  CA\_n5A-n66A  CA\_n5A-n77A  CA\_n48A-n66A  CA\_n66A-n77A | n5 | 5, 10, 15, 20, 25 | 1 |
|  |  | n48 | 5, 10, 15, 20, 30, 40, 506, 606, 706, 806, 906, 1006 |  |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 |  |
|  |  | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
| NOTE 1: This UE channel bandwidth is optional in this release of the specification.  NOTE 2: For the 20 MHz bandwidth, the minimum requirements are specified for NR UL carrier frequencies confined to either 713-723 MHz or 728-738 MHz.  NOTE 3: The SCS of each channel bandwidth for NR band refers to Table 5.3.5-1.  NOTE 4: Only single uplink carriers with power class other than PC3 are listed.  NOTE 5: Minimum requirements for Power Class 2 are applicable for this uplink combination or single uplink carrier in this downlink/uplink combination.  NOTE 6: For this bandwidth, the minimum requirements are restricted to operation when carrier is configured as a downlink SCell part of CA configuration. | | | | |

## 5.5B Configurations for DC

For an NR-DC configuration specified in Table 5.5B-1, the bandwidth combination sets for the corresponding NR CA configuration in 5.5A.3, i.e.,dual uplink inter-band carrier aggregation with uplink assigned to two NR bands, are applicable to Dual Connectivity. If UE supporting NR-DC configuration do not support the corresponding CA configuration, NR-DC configuration is used in CA test cases.

Table 5.5B-1: Inter-band NR-DC configurations (two bands)

| NR-DC  configuration | Uplink NR-DC  configuration |
| --- | --- |
| DC\_n48A-n70A | DC\_n48A-n70A |

## 5.5C Configurations for SUL

Table 5.5C-1: Supported channel bandwidths per SUL band combination

| SUL configuration | NR Band | Channel bandwidth (MHz) (NOTE 1) | Bandwidth combination set |
| --- | --- | --- | --- |
| SUL\_n41A-n83A | n41 | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100 | 0 |
|  | n83 | 5, 10, 15, 20, 30 |  |
| SUL\_n78A-n80A | n78 | 10, 15, 20, 40, 50, 60, 80, 90, 100 | 0 |
|  | n80 | 5, 10, 15, 20, 25, 30 |  |
|  | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 1 |
|  | n80 | 5, 10, 15, 20, 25, 30, 40 |  |
| SUL\_n78A-n81A | n78 | 10, 15, 20, 40, 50, 60, 80, 90, 100 | 0 |
|  | n81 | 5, 10, 15, 20 |  |
|  | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 1 |
|  | n81 | 5, 10, 15, 20 |  |
| SUL\_n78A-n82A | n78 | 10, 15, 20, 40, 50, 60, 80, 90, 100 | 0 |
|  | n82 | 5, 10, 15, 20 |  |
| SUL\_n78A-n83A | n78 | 10, 15, 20, 40, 50, 60, 80, 90, 100 | 0 |
|  | n83 | 5, 10, 15, 20 |  |
|  | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 1 |
|  | n83 | 5, 10, 15, 20, 30 |  |
| SUL\_n78A-n84A | n78 | 10, 15, 20, 40, 50, 60, 80, 90, 100 | 0 |
|  | n84 | 5, 10, 15, 20 |  |
|  | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 1 |
|  | n84 | 5, 10, 15, 20, 25, 30, 40, 50 |  |
| SUL\_n78A-n86A | n78 | 10, 15, 20, 40, 50, 60, 70, 80, 90, 100 | 0 |
|  | n86 | 5, 10, 15, 20 |  |
| SUL\_n79A-n80A | n79 | 40, 50, 60, 80, 100 | 0 |
|  | n80 | 5, 10, 15, 20, 25, 30 |  |
|  | n79 | 40, 50, 60, 80, 100 | 1 |
|  | n80 | 5, 10, 15, 20, 25, 30, 40 |  |
| SUL\_n79A-n81A | n79 | 40, 50, 60, 80, 100 | 0 |
|  | n81 | 5, 10, 15, 20 |  |
| SUL\_n79A-n83A | n79 | 40, 50, 60, 80, 100 | 0 |
|  | n83 | 5, 10, 15, 20, 30 |  |
| NOTE 1: The SCS of each channel bandwidth for NR band refers to Table 5.3.5-1. | | | |

Table 5.5C-2: Supported channel bandwidths per SUL band combination with intra-band non-contiguous CA

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Table 5.5C-3: Supported channel bandwidths per SUL band combination with intra-band contiguous CA

| SUL band combination with CA | SUL configuration | NR Band | Channel bandwidth (MHz) (NOTE 1) | Bandwidth combination set |
| --- | --- | --- | --- | --- |
| SUL\_n41C-n83A | SUL\_n41A-n83A | n41 | CA\_n41C\_BCS1 | 0 |
|  |  | n83 | 5, 10, 15, 20, 30 |  |
| SUL\_n78C-n80A | SUL\_n78A-n80A | n78 | CA\_n78C\_BCS1 | 0 |
|  |  | n80 | 5, 10, 15, 20, 25, 30, 40 |  |
| SUL\_n78C-n84A | SUL\_n78A-n84A | n78 | CA\_n78C\_BCS1 | 0 |
|  |  | n84 | 5, 10, 15, 20, 25, 30, 40, 50 |  |
| SUL\_n79C-n83A | SUL\_n79A-n83A | n79 | CA\_n79C\_BCS0 | 0 |
|  |  | n83 | 5, 10, 15, 20, 30 |  |
| NOTE 1: The SCS of each channel bandwidth for NR band refers to Table 5.3.5-1. | | | | |

Table 5.5C-4: Supported channel bandwidths per SUL band combination with inter-band CA

| SUL band combination with CA | SUL configuration | NR Band | Channel bandwidth (MHz) (NOTE 1) | Bandwidth combination set |
| --- | --- | --- | --- | --- |
| CA\_n1A\_SUL\_n78A-n80A | SUL\_n78A-n80A | n1 | 5, 10, 15, 20, 25, 30, 40, 50 | 0 |
|  |  | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
|  |  | n80 | 5, 10, 15, 20, 25, 30, 40 |  |
| CA\_n1A\_SUL\_n78A-n84A | SUL\_n78A-n84A | n1 | 5, 10, 15, 20, 25, 30, 40, 50 | 0 |
|  |  | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
|  |  | n84 | 5, 10, 15, 20, 25, 30, 40, 50 |  |
| CA\_n3A\_SUL\_n78A-n80A | SUL\_n78A-n80A | n3 | 5, 10, 15, 20, 25, 30, 40 | 0 |
|  |  | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
|  |  | n80 | 5, 10, 15, 20, 25, 30, 40 |  |
| CA\_n28A\_SUL\_n41A-n83A | SUL\_n41A-n83A | n28 | 5, 10, 15, 20, 30 | 0 |
|  |  | n41 | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100 |  |
|  |  | n83 | 5, 10, 15, 20, 30 |  |
| CA\_n28A\_SUL\_n79A-n83A | SUL\_n79A-n83A | n28 | 5, 10, 15, 20, 30 | 0 |
|  |  | n79 | 40, 50, 60, 80, 100 |  |
|  |  | n83 | 5, 10, 15, 20, 30 |  |
| NOTE 1: The SCS of each channel bandwidth for NR band refers to Table 5.3.5-1. | | | | |